

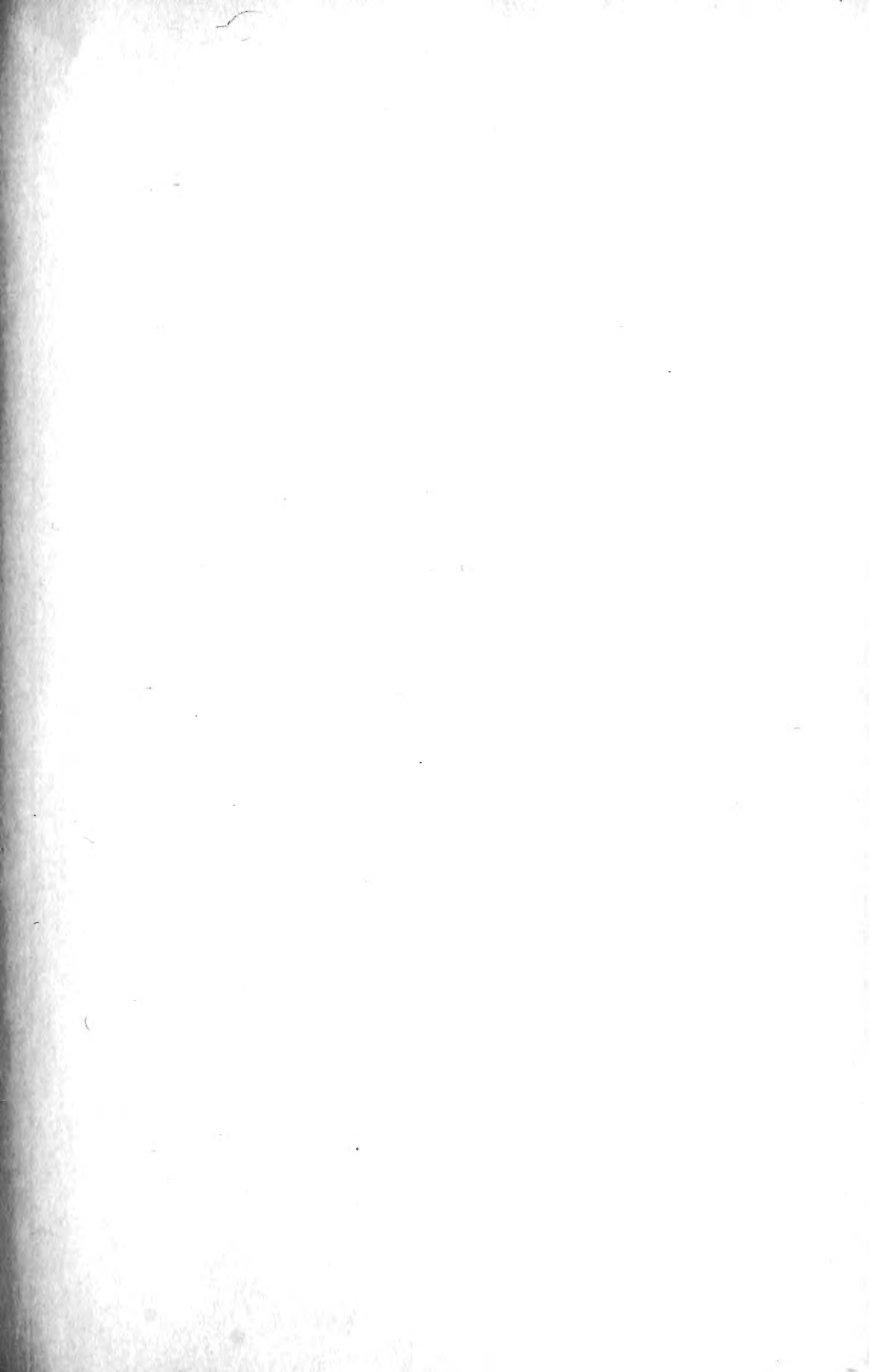


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# American Museum of Natural History

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# The American Museum Journal

VOLUME XIII

JANUARY, 1913

NUMBER 1

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MARY CYNTHIA DICKERSON, *Editor*

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# The American Museum Journal

FOR 1913

FREE TO MEMBERS OF THE MUSEUM

AN ILLUSTRATED MAGAZINE DEVOTED TO A POPULARIZATION  
OF SCIENCE WITH STRONG EMPHASIS  
ON ITS HUMAN INTEREST

THE AMERICAN MUSEUM JOURNAL takes the reader out into every part of the world with great explorers,— with Stefánsson who discovered the Eskimo of Coronation Gulf, with Akeley who hunted elephants on the slopes of Mount Kenia, with Andrews who pursued whales in the Japan Sea. During 1913 it will follow Stefánsson again who is going back to the Arctic ice fields; Macmillan who leads a party in search of the dimly seen Crocker Land; Lang and Chapin who have not yet returned from the Congo expedition in the heart of Africa; Chapman who is now on his way to South America for tropical birds; an expedition which leaves soon for Alaska to hunt the bowhead whale; another which is already in the South Georgia Islands for sea leopards and king penguins; and still others not yet organized.

The AMERICAN MUSEUM JOURNAL contains articles by the men who are doing this work, who above all others can speak of it authoritatively, as well as by writers such as Robert E. Peary, Henry Fairfield Osborn, Theodore Roosevelt, George B. Sudworth and others as distinguished, scheduled to appear in the list of contributors for 1913.

It presents articles of current interest on subjects such as comparison of Arctic and Antarctic exploration, Chinese culture in the light of recent history, cultures and psychology of the negro races of Africa, conditions at the Pribilof fur-seal rookeries, reproduction of the bigtrees of California, the conservation of our forests and of the world's animal life, the problem of polluted river and harbor waters.

At home in the American Museum, it takes the reader behind the scenes so that he may see sculptors and preparators modeling some jungle beast, creating a panorama of wilderness life or mounting the fossil bones of a prehistoric animal. Most important of all it tells of the educational campaign in progress at the Museum and the coöperation which exists between its work and that of the public schools of New York City. In brief the AMERICAN MUSEUM JOURNAL is a medium for the dissemination of the idea to which the Museum itself is dedicated — namely, that without deepening appreciation of nature, no people can attain to the higher grades of knowledge and worth.

THE AMERICAN MUSEUM JOURNAL is sent free to all members of the Museum, who are entitled to many privileges besides, which it is not practicable to extend to others. Among these privileges are the attendance of guide or instructor at the Museum whenever desired, tickets admitting to all the institution's courses of lectures, the use of the members' room with service, and complimentary copies on request of the many popular publications of the Museum.

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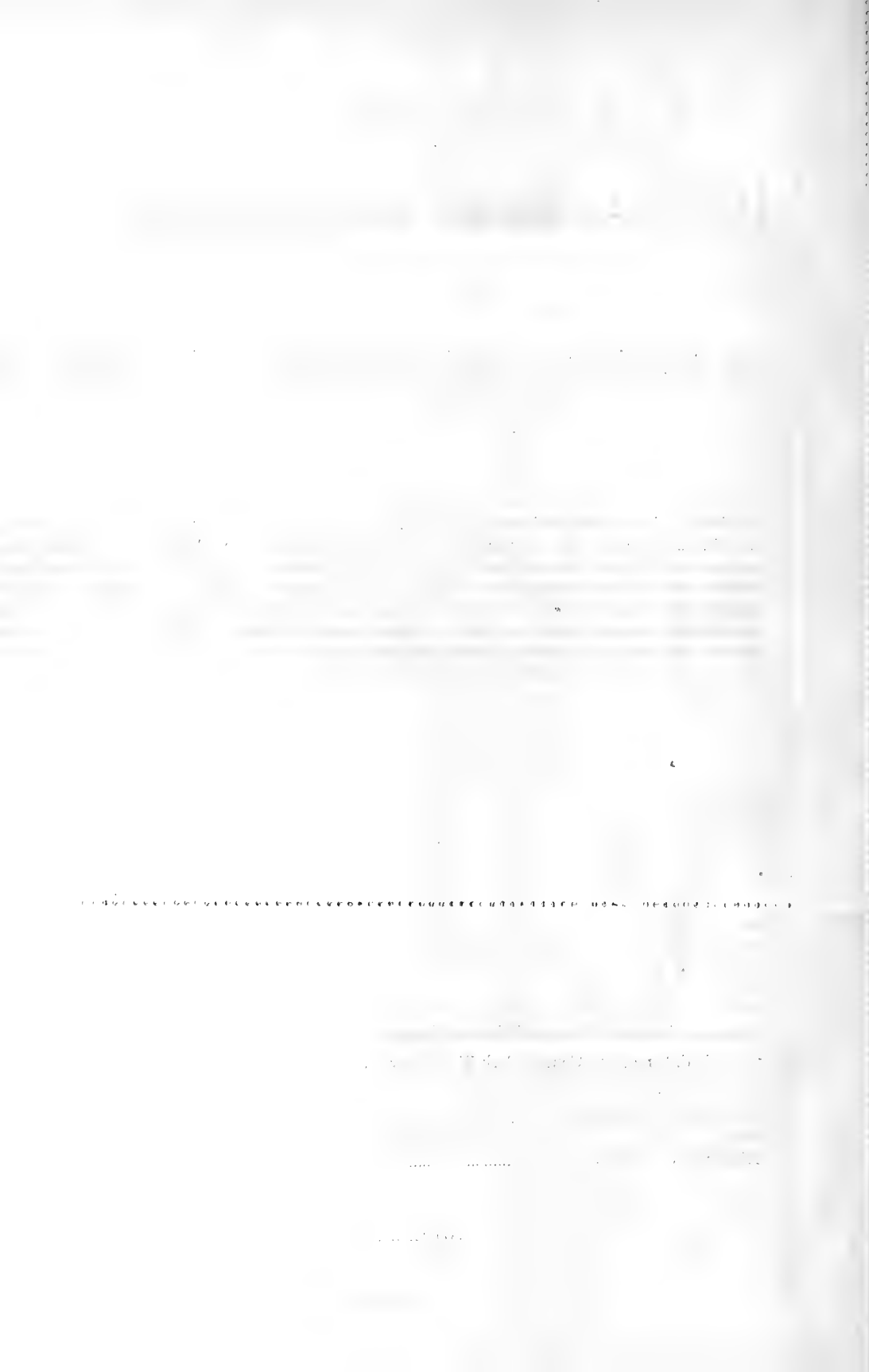
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MORRIS KETCHUM JUMP  
DONOR OF THE COLLECTION OF  
NORTH AMERICAN WOODS  
PRESENTED BY THE MICHIGAN

# The American Museum Journal

VOL. XIII

JANUARY, 1913

No. 1

## PORTRAIT OF MORRIS KETCHUM JESUP

COMMENT BY THE ART CRITIC, MR. J. EASTMAN CHASE, ON A  
BRONZE BAS-RELIEF EXECUTED BY MR. JAMES E. FRASER

IN making this memorial portrait of the donor of the great collection of North American woods to the Museum whose interest he did so much to promote, the sculptor's idea was first that it should be in harmony with its surroundings and secondly that it should fittingly express Mr. Jesup's interest in what was the object of an absorbing and lifelong devotion. All the details of the composition have been carefully considered in whatever way they might contribute to unity of thought and action and we can say that the result is entirely in keeping with this double conception.

Mr. Jesup is represented as walking in the woods, clothed as a man would be on such an occasion and accompanied by his dog as a silent but sympathetic companion. The mood is one of pleasurable contemplation. The large and easy movement of the figure and the fine intelligence of the face convey a vivid and agreeable impression of the character of the man. In no more appropriate manner could Morris Ketchum Jesup be represented in an enduring form than walking among the trees which so deeply interested him all his life.

"Loving them all  
Among them he walked as a scholar who reads a book."

BY THOSE WHO LOVE THE TREES OF NORTH AMERICA, MORRIS  
KETCHUM JESUP WILL ALWAYS BE GRATEFULLY REMEMBERED<sup>1</sup>

Almost the first step taken by Mr. Jesup upon his accession to the presidency [of the Museum] was the creation at his own expense of a department having in view a collection of all the woods in the United States. . . .

"The formation of the Jesup Collection of North American Woods," writes Mr. Sargent, "was a matter of national importance. The preparation of this collection enabled us to study the distribution of the economic value of many trees which, before Mr. Jesup's undertaking, were largely unknown. I think it can be said that this collection is the finest representation of forest wealth that exists in any country."

Through his interest in this collection Mr. Jesup was led to study the larger questions connected with forestry, and his energetic advocacy of the work of forest preservation was the direct outcome of this interest. "Mr. Jesup," continues Mr. Sargent, "certainly played an important part in the early movement for the better care of the North American forests, and by those who love trees he will always be gratefully remembered."

<sup>1</sup>Quotations from *Morris Ketchum Jesup: A Character Sketch*. By William Adams Brown. Charles Scribner's Sons, 1910.



RETURN FROM A FALL HUNTING TRIP, SEPTEMBER, 1911

On the willow-grown "Barrens" between Langton Bay and Horton River. We went inland with pack-dogs and when the snow came, were obliged to go back to the coast for the sleds. A good dog will carry a forty-pound pack twelve or fifteen miles a day, and in packing short distances sometimes carries as much as seventy-five pounds

## ARCTIC GAME NOTES<sup>1</sup>

DISTRIBUTION OF LARGE GAME ANIMALS IN THE FAR NORTH —  
EXTINCTION OF THE MUSK OX — THE CHANCES FOR SURVIVAL OF MOOSE AND CARIBOU, MOUNTAIN SHEEP,  
POLAR BEAR AND GRIZZLY

By Rudolph M. Anderson

Illustrations from photographs by the Author

THE hunting done by Arctic expeditions, as pointed out by Admiral Peary, is almost entirely utilitarian, supplementing the food supply. The plan of exploration of the Stefánsson-Anderson expedition entailed living upon the country, and too often the immediate needs of the party impelled the use of the rifle where stalking with field glasses and camera would have been more desirable scientifically. The faunal naturalist properly considers it a crime to kill an animal while there remains something to be learned of its habits. Deprecating the necessity, we could justify such deeds only by the reasoning that justifies acts of necessity in war. Wringing sustenance from the Arctic wilderness is war: arms and the man continually pitted against the strength, speed or cunning of the wild beast backed by the rigors of his chosen habitat, a conflict without truce or parley and with no quarter to the vanquished.

There were compensations however. Living to a large extent upon the country made the economic side of the fauna an object of daily research, by the natives of our parties as well as by ourselves. As with all nomad hunters the one absorbing topic of general interest and discussion was the game of the country, its condition and pelage, its abundance, distribution, migrations and habits — and to people living the carnivorous primitive life the game forms a faunal list nearly all-inclusive. It may be remarked in passing that a much greater part than is generally supposed of the savage's lore of the animal world, rehearsed around the campfire and to a large extent practiced in the field, is founded upon old legends and superstitions accepted unquestioningly from former generations, rather than upon personal observation.

The moose is a game animal that is increasing in numbers all through the Mackenzie country, according to the opinion of the old residents and to data collected by the expedition, and has in recent years noticeably extended its range in the Mackenzie delta and to the north and east of Great Bear Lake to the very edge of the timber line and beyond. The moose owing to its habits cannot be slaughtered wholesale as can the caribou and musk ox, and the northern Indians have decreased in numbers at a much more rapid rate than their power to kill has improved with modern weapons.

For the barren ground caribou the story is one of decrease, the same everywhere. In nearly every region where a few are now found, thousands roamed only a few years ago, and many a former feeding-ground now

<sup>1</sup> Article and photographs copyrighted by Rudolph M. Anderson, 1913.

sees the animals no more. Not many years ago, the coastal plain of Arctic Alaska from Point Barrow to the Mackenzie was the pasture of vast herds of caribou. Only an occasional scattered band is now seen. As a consequence many families of Eskimo have been compelled by starvation to move out, notably from the Colville River region. The caribou are practically extinct around Point Barrow and our party in summer found only a few between Cape Halkett and the Colville, a herd of perhaps four hundred in the Kuparuk River delta (the only large band seen by anybody in northern Alaska that season) and other small bands as far east as Demarcation Point. Around the mouth of the Mackenzie the caribou have practically disappeared although stragglers are occasionally seen on Richard Island and in the Eskimo Lakes region. Few are now found on the Cape Bathurst peninsula and only small numbers around Langton Bay and Darnley Bay. This great diminution of caribou all along the Arctic coast from Cape Parry west has mostly occurred within the past twenty years, since the advent of whaling ships to the western Arctic. There are places in the interior of Alaska which are more favored. On one of the northern tributaries of the Yukon in December, I saw as many as one thousand in a single herd.

Farther east also the caribou are more plentiful. Victoria Island pastures great numbers in summer. These herds cross to the mainland south of Victoria Island as soon as Dolphin and Union Strait and Coronation Gulf are frozen over in the fall, returning over the ice in April and May. Some caribou are also found all summer around Great Bear Lake and the Coppermine River. Large numbers winter on Caribou Point, the large peninsula between Dease Bay and McTavish Bay at the eastern end of Great Bear Lake. Here on the cold, calm days of midwinter the steam from the massed herds often rises like a cloud over the tops of scattering spruce forests.

The Eskimo of this region have no firearms and kill caribou by driving a herd between long rows of rock monuments into an ambush of concealed bowmen, or by driving the deer into lakes and spearing them from kayaks. On the Barren Grounds around Coronation Gulf these *inukjuvit* [*inuk* (man)-like] caribou drives are found everywhere. But even here the older people say that in their youth caribou were much more abundant.

These natives live almost entirely upon seal in winter and hunt caribou very little at that season. Consequently they do not travel much by sled and keep few dogs. With the advent of rifles in the near future, the natives who elect to follow the caribou in winter will be obliged to keep two or three times as many dogs as at present, feeding them on caribou meat as did the Alaskans, with the certainty of a speedy diminution of caribou in this region as in northern Alaska.

The caribou is without question the most important animal of the Arctic. Its extinction would be a calamity to the natives. Its skin is an article of clothing hardly to be dispensed with, while as a source of food supply we can





Point Williams, southwest coast of Victoria Island on Dolphin and Union Strait. The sea cliffs are about 125 feet high here, and hundreds of short-billed gulls (*Larus brachyrhynchus*) with a few glaucous gulls (*Larus hyperboreus*) were nesting among little niches and ledges in the face of the rocks.



Whaleboat sailing up the eastern branch of the Mackenzie delta. The delta is more than a hundred miles wide and has thousands of islands with a labyrinth of intersecting channels. One of our whaleboats navigated three times through parts of the delta and along much of the north coast of Alaska.



Kittigaryuit, on the eastern side of the Mackenzie delta, opposite the southeastern side of Richard Island. This was formerly the largest settlement of the Mackenzie Eskimo, and the surrounding hills are covered with house ruins and burial heaps. The spring of 1910 was spent in this locality. 7



Inuktit caribou drive on north side of Dismal Lake near the Narrows. Little monuments of rock, or blocks of turf, are set up in series, often extending for miles and converging at some natural ambush. On the Barren Grounds in late spring, the Eskimo sometimes carry blocks of snow to make white monuments for the same purpose

truthfully say that there are many vast sections of the Canadian northland which could with difficulty even be explored without relying upon the herds of barren ground caribou.

The hunting of the barren ground caribou as it is practiced by white men and Eskimo who use firearms is in theory a very simple matter. The prime requisites are unlimited patience and much hard work. The field glass or telescope is almost as necessary as the rifle, since the caribou should be discovered at a distance. The band is spied out from the highest knolls or elevations and if the country is rough enough to afford even a little cover, the approach is comparatively easy by hunting up the wind, as the caribou do not see very far. On a broad, flat tundra plain where there is no cover, obviously the proper thing to do is to wait for the caribou to browse slowly along and move on to more favorable ground for stalking. During the short days of winter this is often impossible and under any circumstances is trying to the patience. The reputed superiority of the Eskimo hunter over his white confrère seems to be only in the former's willingness to spend unlimited time in approaching his quarry.

Our collection embraces caribou from the Chandlar River and various points on the north coast of Alaska, Franklin Bay, Horton River, Great Bear Lake, Coppermine River, Coronation Gulf and Victoria Island.

As to musk oxen, the last around Franklin Bay were killed by Eskimo hunting for the whaling ships about fourteen years ago, and some ten years ago an Eskimo sled party got twenty-four musk oxen many days' journey



One day's catch of fish (mostly salmon trout), near the foothills of Endicott Mountains, Hula-hula River, Alaska. Dr. Anderson with three Eskimo and seventeen dogs was frozen in with two boats, near Barter Island early in September, 1908, and had to make an overland hunt to a series of fishing pools which remain open most of the winter



"Cutting-in" a bowhead whale. The dead animal is lying alongside the ship and rolls in the water as the blubber strips are torn away. This species of whale has exceedingly thick blubber to protect it from the intense cold of the Arctic waters



SCENE NEAR THE MOUTH OF DEASE RIVER

southeast of Darnley Bay. The Indians have within the past four or five years practically exterminated the species around the east end of Great Bear Lake, and from all the information we could get from the Coronation Gulf Eskimo, musk oxen are seldom if ever seen near the mainland coast less than seventy-five miles east of the mouth of the Coppermine River. The musk oxen are so readily killed, often to the last animal in a herd, that the species cannot hold its own against even the most primitive weapons, and the advent of modern rifles means speedy extermination.

In Arctic Alaska, the white mountain sheep (*Ovis dalli*) is undoubtedly fast diminishing in numbers. The sheep probably never ranged east of the Mackenzie although they are said to be fairly common in the mountains on the west side of the river from Fort Norman to the west side of the delta. The Endicott Mountains or that branch of the northern Rockies which runs northwest from the western edge of the Mackenzie delta, form a divide ten or fifteen miles from the coast west of Herschel Island and seventy-five or one hundred miles from the coast at the Colville, the largest river flowing into the Arctic in northern Alaska. Sheep were formerly quite numerous at the heads of nearly all the rivers on the Arctic side of the divide, at least as far west as the Colville. It is probable that until comparatively recent times, before whaling ships began to winter at Herschel Island in 1889, the sheep were not much hunted in this region. The caribou were larger, more abundant and more easily taken. The gradual extermination of the caribou in northwestern Alaska, combined with other causes, has for many years sent family after family of Eskimo from the rivers in the Kotzebue Sound region across to the Colville River, at the same time that many Colville Eskimo have gradually moved eastward, occupying one mountain river valley after another until the sheep became too scarce to support them. Many of these Eskimo then gave up sheep-hunting and moved into the Mackenzie delta or to Point Barrow.

In my sheep-hunting expedition of October, 1908, along the Hula-hula River, which has a course of about forty-five miles in the mountains, I met two Eskimo families of five each and hunted with them until December. We crossed the divide over a pass not known to have been crossed by a white man before and spent the midwinter season hunting caribou on the south side of the mountains along a branch of the Chandlar River, a tributary of the Yukon. Returning in February we spent several weeks more with the sheep-hunters on the north slope. Sheep seemed to be much more common on the north side of the divide than on the south side, although the south side is an uninhabited wilderness.

One of the Hula-hula sheep-hunters, Kunagnanna, had in this small river valley killed thirty or thirty-five sheep from June to August, 1908, and thirty-seven from September, 1908 to May, 1909, subsisting with his whole family on sheep. He had come originally from the head of Kotzebue



#### THE EXPEDITION ON THE COPPERMINE RIVER

Photographed to show rough blocks of ice heaped up along the banks. The Coppermine has a very swift current and floating masses of ice pile up along the shores before the river freezes completely across in the fall. In some places the river gives the impression of rough sea ice



**ESKIMO MOUNTAIN-SHEEP HUNTERS AT HEAD OF HULA-HULA RIVER, ARCTIC ALASKA**

The hunters are leaving their winter quarters. The winter houses of Alaskan inland Eskimo, with dome-shaped framework of bent willows, covered with blocks of moss, are seen in the willow brush along the side of the river bed. Many white mountain sheep were killed on the mountains in this vicinity during the winter of 1908-1909

Sound and after helping to thin out the sheep in three of the valleys east of the Colville, had made his last stand on the Hula-hula.

Although the numbers of sheep have been greatly reduced, I believe that a few are still found near the head of every river from the Colville to the Mackenzie. The natives hunt strictly for meat and skins, and the habitat of the sheep prevents the hunters from picking up this animal as a side line to other game hunting or trapping. When a local influx of hunters cuts down the number of sheep beyond a certain limit in some mountain valley, pressure of hunger soon causes the people to move out. Word is passed along that a certain river is starvation country and an automatic close season affords the sheep a chance to recuperate.

The barren ground bear or grizzly is of interest as a rare species in collections. This bear, known to the Eskimo as *aklak* from Bering Sea to Coronation Gulf, is perhaps referable to several races. In northern Alaska it does not appear to be very common in the mountains and seldom if ever comes out on the coastal plains. The inland Eskimo occasionally kill specimens and often use the skin for a tent door. In the Mackenzie delta, tracks are often seen, but the bears are seldom killed owing to the impracticability of hunting them through the dense underbrush on the islands in summer. The Eskimo, who are usually undaunted under any circumstances by *nannuk*, the polar bear, speak with much greater respect of the pugnacity of *aklak* and are much more cautious about attacking him. Many a time I have been warned against shooting at a barren ground bear unless from above — as a wounded bear has greater difficulty in charging uphill. So far as our experience goes however, the barren ground bear is an inoffensive and wary brute preferring to put as much ground as possible between himself and human society. I saw but one unwounded grizzly come toward men, but as he did not have their scent his advance was perhaps out of mere curiosity. As he was on the uninhabited coast between Cape Lyon and Dolphin and Union Strait and he had probably never seen human beings before, this inference seems plausible.

We found the center of greatest abundance of the barren ground bears in the country around Langton Bay and on Horton River not more than twenty or thirty miles south from Langton Bay. In this region our party killed about twenty specimens, most of which were obtained on our dog-packing expeditions in early fall. The barren ground bears go into hibernation about the first week of October and come out again early in April while the weather is still very cold. They seem to be nearly as fat on their first emergence from their long sleep as in the fall but speedily lose weight and early summer specimens are invariably poor. This is natural from the nature of their food which is to a large extent vegetable. Although the bear country is conspicuously furrowed in many places by the unearthed burrows of Arctic spermophiles, I believe the bear's search is more for the little mam-

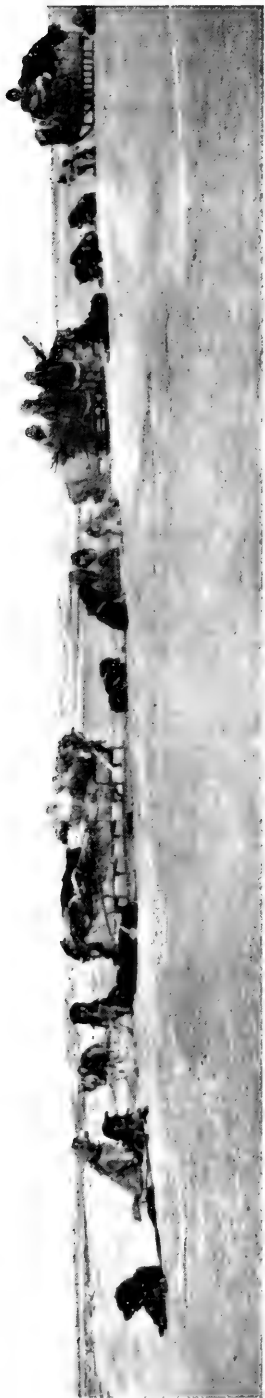


mal's stores of roots than for the animal itself. The bear's stomach is much more apt to contain *masu* roots (*Polygonum Bistorta*) than flesh. A bear must needs be very active to catch enough spermophiles above ground in spring and early summer, and if carcasses are not to be found the bears evidently suffer from hunger at this season when they can neither dig roots for themselves in the frozen ground nor dig out the spermophiles and their stores.

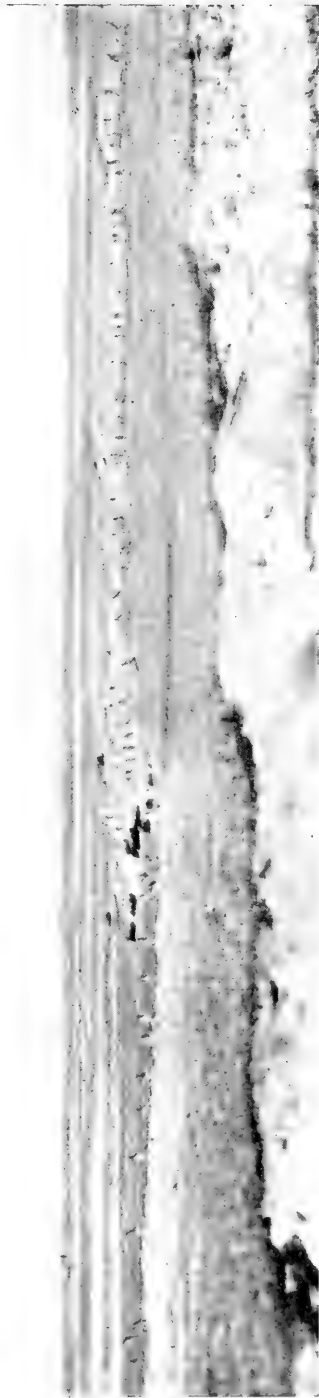
One specimen was killed by an Eskimo of our party on Dease River east of Great Bear Lake, after the bear had gorged himself on a cache of caribou meat. A few were met with in the Coppermine country, but through the Coronation Gulf region they are apparently rare. The Eskimo say that the species is not found on Victoria Island. Fortunately for the brown bear's longevity, there is little market for his skin and neither Eskimo nor Indians make a special effort to hunt him, the specimens obtained in general being picked up on summer caribou hunts.



Mosquitos in the Colville River delta, Arctic Alaska, about 71° N. Lat., July 5, 1909. The Eskimo, Natkusiak, had stood still for a minute or two and refrained from brushing them off while loading our umiak



On the ice of Franklin Bay March, 1912. A rest white hauling specimens from Langton Bay to Baillie Island (Cape Bathurst)



Willow ptarmigan on low hills near the mouth of Okpilak River, a little west of Barter Island, Alaska. At this season (September 25), the birds were changing from the dark summer plumage to the white plumage of winter



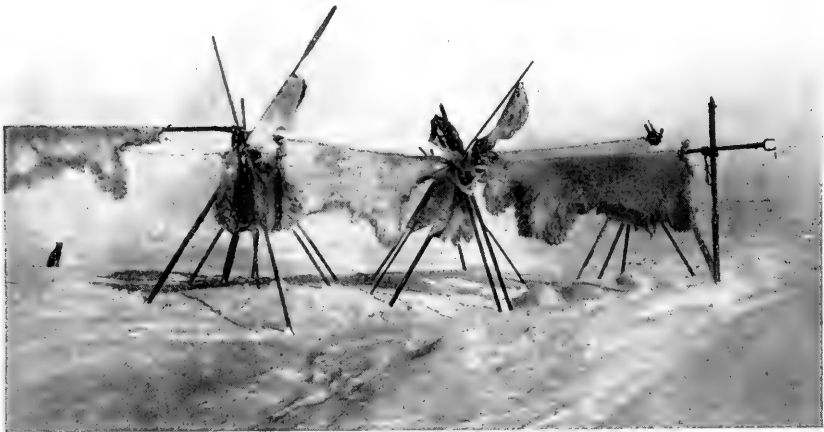
#### CAMP OF A ZOÖLOGIST IN ALASKA

On a branch of the Chandlar River, one of the large northern tributaries of the Yukon. Travel on parts of this river was difficult because of scarcity of game, and the frequent flooding of the surface of the ice in midwinter

The polar bear is of less interest — a circumpolar cosmopolitan, although seldom found far from the sea ice. In winter these bears are apt to appear anywhere along the coast, but in summer their occurrence depends largely upon the proximity of pack ice. Around Cape Parry in August we saw within two days fourteen bears roaming about the small rocky islands, evidently marooned when the ice left the beach.

The polar bears seem to be most abundant around Cape Parry and the southern end of Banks Island, very rarely passing through Dolphin and Union Strait into Coronation Gulf. They are often seen swimming far out at sea. While whaling about twenty miles off Cape Bathurst (the nearest land) and about five miles from the nearest large ice mass, we saw a polar bear which paddled along quite unconcernedly until he winded the ship, then veered away, heading out toward the ice pack.

As a field for short trips of investigation, the region east of Point Barrow can hardly be recommended, as after four years in the country, the only available means of exit last summer was a fortunate chance to ship for a three months' cruise on a whaling ship. And certainly we should not fail to mention the bowhead whale as the greatest game animal of the Arctic. The whaling industry which a few years ago kept a fleet employed in the western Arctic, once wintering fifteen ships at Herschel Island, and which directly or indirectly was responsible for the advent of civilization along these shores, with its concomitant effects upon population and fauna, has now declined to casual vessels which combine whaling with trading. The bowheads are far from being extinct however, and the single ship and schooner which whaled east of Point Barrow during the past summer



Bear skins drying in the sun at Baillie Island for the Museum collection



Polar bears swimming, near Cape Parry

captured twelve whales apiece, but the claims of some whalers that the numbers of whales have not been greatly reduced by the last quarter century of chase, seems extravagant.

The limits of this paper prevent extended discussion of the haunts and habits of the smaller Arctic birds. From September to May practically the only game bird is the ptarmigan. From northwestern Alaska to Franklin Bay, I found both the willow and rock ptarmigan present in almost every locality, while in the Coronation Gulf region only the rock ptarmigan was found. Immense numbers appear on the coast in early spring although some are found the year round. As these birds are spread so universally over a vast territory and people are so few, a comparatively small number are killed. A few are snared and netted but unless other food fails, ptarmigan are usually considered too small to waste ammunition on. The trapping of mammals by the natives is beneficial to the birds, destroying a large number of predatory foxes and the like, which in summer feed extensively on birds, their nests and eggs.

In the region around Kittigaryuit near Sir J. Richardson's Point Encounter on the eastern side of the Mackenzie delta, there is more bird shooting than among any other Eskimo I met. In 1910 the whole population for about a month depended almost entirely on the white-fronted, Hutchins's, black brant and snow geese, as well as on numbers of whistling swans. Ducks were considered too small and were not often molested. An interesting experience here one June was a long sled trip over the ice of the Mackenzie estuary to a locally famous brant rookery. Only a few miles south of this typically Arctic zone, up inside the tree line south of Richard Island, the birds are of the Canadian zone — robins, yellow warblers and thrushes being common.

The black brant commonly nests around fresh water lakes and tundra marshes from western Alaska as far east as the Duke of York Archipelago in Coronation Gulf. Rookeries of the king and Pacific eider are found locally at various points along the Arctic coast of Alaska, near Cape Brown, at the mouth of the Horton River in Franklin Bay, Langton Bay and Cape Parry, and a few were found on the coast of southwestern Victoria Island. At Cape Bathurst thousands of male eiders passed westward nearly every day in July, first the king eiders and then the Pacific eiders. The females and young follow west later in the summer. These immense numbers of eiders must breed on Banks Island, Victoria Island or the northern islands, as the rookeries on the mainland west of Coronation Gulf do not seem sufficient to account for the tremendous numbers flying west after the breeding season.

One spring season was spent around the Colville delta in Alaska. There was here perhaps a greater variety of species than at most Arctic points visited but no great numbers of individuals. Mosquitos were as abundant here as usual in the north, perhaps not more so than in the Mackenzie delta,

but as we passed the summer without mosquito netting my recollection is more vivid. I shall never forget the clouds of ravenous mosquitos which hovered over me as I tried to photograph the nest of a ruddy turnstone on a flat delta island. Still another spring was occupied on the south side of Coronation Gulf where however an unusually small number of species tarried. Most of the birds which reached this section of the Arctic coast kept on going to Victoria Island or the numerous archipelagoes north of us. The last spring found me on the Cape Bathurst peninsula on



Nest of red-throated loon (*Gavia stellata*), at edge of a little tundra lake near Coronation Gulf, Northwest Territory, Canada

the western shores of Franklin Bay. The lowlands extending from the Smoking Mountains west to Liverpool Bay are a favorite resort for snow geese, black brant, golden plover and the three species of jaegers, with ptarmigan and smaller birds.

While of course in many districts the aboriginal population has been much reduced, I think it is true that the people who remain do not hunt birds so much as before the days of modern weapons. The native of the present day must make long summer journeys to trading posts or ships, and many famous rookeries which were annually resorted to in the egg season, and other places where the people gathered later in the season to club or spear the flightless molting waterfowl, are nowadays seldom visited. The natives of the north taking them all together can hardly be held responsible for any notable diminution of bird life in the country, as they may for the mammal life. The mammals are only to a slight degree migratory, while most of the bird species are but short summer transients in the north and must run the gauntlet of countless fusillades in more southern latitudes from September to May and in some instances through an extent of the Western Hemisphere from Canada to Patagonia.



Young glaucous gull (*Larus hyperboreus*) hiding among rocks. Island in Simpson Bay, Victoria Island



Ruddy turnstone (*Arenaria interpres morinella*) and nest. Colville River delta, northern Alaska



Nest of Pacific eider (*Somateria v-nigra*). Simpson Bay, Victoria Island



Young rough-legged hawks (*Archibuteo lagopus sancti-johannis*). Herschel Island, Yukon Territory, Canada



A SPHERE OF FLAWLESS QUARTZ

A silver-mounted sphere of quartz, water pure, of beautiful symmetry and more than four inches in diameter, recently presented to the Museum by Mr. J. Pierpont Morgan. The largest known crystal sphere measures seven inches in diameter. It is in the Green Vault at Dresden



## THE MYSTIC CRYSTAL SPHERE

By L. P. Gratacap

**A** MOST refined perception, developed perhaps often along narrow and technical lines distinguishes the connoisseur who is besides pre-eminently a collector. The recognition of the bold or delicate treatment of intaglio or relieve in onyx cutting, whether of antique or of the equally prized modern workmanship (Pistrucci, Girometti, Natter, Pichler) is acquired only by long observation and comparison, unless indeed the enviable power of discernment is bestowed by nature. Among gem stones, quality, color, limpidity, are probably sooner learned in their best development, though here again it is surprising how almost intuitional seems the skill of the gem expert in separating cut stones according to their species and their values in a miscellaneous group. The guiding features of natural form and association are absent, nevertheless the acute judge separates the different minerals, deceptively enhanced in their beauty by their cut, with amazing certainty. Very serious blunders occur, but they are really infrequent with those accustomed through a long experience to handle gems, and to detect the contrasted phases in the same mineral.

Quartz is a protean mineral assuming in nature a remarkable number of aspects but never attaining except in its hydrated and softer condition as opal, significant gem value, unless indeed the more beautiful amethysts are given this coveted rank. And yet quartz of the purest quality attains a very unusual value, when it justifies the ancient identification of its qualities with ice and when this perfection of texture and stainless purity are brought by the cutter to their highest development to the eye, as in the "crystal sphere."

Of course the cameo contrived from the hard and many colored onyx possesses little commercial value apart from the talent or genius of the artist who shapes his exquisite images. But the quartz that meets the exacting requirements of the connoisseur in the formation of the crystal sphere which he so jealously prizes, must be flawless, and this immaculate state in masses large enough to yield the larger quartz balls is not so commonly encountered. In 1886 Tiffany and Company received a mass of rock crystal weighing fifty-one pounds, part of an original crystal which Dr. G. F. Kunz estimated might have weighed three hundred pounds, from which an almost perfect ball four and one-half to five inches in diameter could have been cut. This extraordinary fragment came from Ash County, North Carolina, and in its vicinity occurred two crystals, one of which weighed two hundred and eighty-five pounds. The island of Madagascar furnishes quartz in rolled masses, sometimes weighing a hundred or more pounds, and these reappear in China or Japan in those wonderful spheres which fascinate not only the oriental collector but also his western competitor, and which by a crude perversion of their beauty, assist the impostor to read fortunes and predict the future.

One of these beautiful objects has recently been added to the gem collection through the munificence of Mr. J. Pierpont Morgan. It is water pure,  $4\frac{11}{16}$  inches in diameter, and of almost ideal symmetry. The "crystal ball" has been regarded for centuries with a singular veneration reflected to-day in those curious hallucinations which serve the cupidity of wizard and seer. But amongst the Orientals its peculiar fascination has exercised a predominant sway. Crystal balls are prized among the precious objects of the collector's cabinet, and it is with the most exacting and fastidious care that the buyer examines his prospective purchase as he turns it round and round in his microscopic search for some flaw, feather, cloud, stain, inclusion, irregularity, which would diminish its incomparable purity. When his patient and minute examination has convinced him of its freedom from defects he is willing to pay generously for its possession.

The preparation of these spheres with the Japanese or Chinese formerly consumed much time and as Dr. Kunz has said, "skill, patience and hereditary pride made up for any lack of labor-saving tools." The masses, at first rudely rounded into globular forms by chipping with small steel hammers, were subsequently ground down to an even surface with powdered garnet or emery, in cylindrical short troughs of iron, like "graters." The last transforming polish which transfigures the dull surface into a lustrous mirror is imparted by rubbing with bamboo and with the hand dipped in rouge. When finished the resplendent object is ready for its mounting, usually upon bronze waves where it is borne like a congealed drop of the water's spray.

Modern economy of labor and mechanical device have shortened the laborious process of the eastern workman and the pieces of quartz are placed in semicircular grooves in huge grindstones where they are held until the contour coincides with the rounded sides of the revolving mold. Water is liberally used as the friction heats the crystal, the sudden application of moisture almost invariably developing cracks however.

Polishing is effected on a wooden wheel with tripoli or on a leather buff with tripoli or hematite. This mechanical operation eliminates the individual skill of the workman and while it would seem to diminish the æsthetic interest of the product, it immensely accelerates the work and obviously insures its geometrical perfection.

The crystal ball has become an enviable feature in all collections of beautiful mineral artifacts, and the Oriental finds his market extended over the whole world of dilettants and experts. In the Green Vault at Dresden there is the largest and most perfect crystal sphere known, weighing some fifteen pounds and measuring nearly or quite seven inches in diameter. The great value of the larger sphere arises from the rarity of the quartz masses of desirable quality for their creation. In Japan the islands of Nippon and Fujiyama yield superior material and fragments have been uncovered in the great gravel beds — in ancient stream beds. Frequently serviceable

masses have been impaired by the jolts or blows accompanying their transportation, which produce funnel-shaped flaws that may extend further and hopelessly ruin the integrity of the mineral's texture.

In the ancient river channels of California, dislodged crystals in confused association have been found as at Mokelumne Hill, Calaveras County; some of sufficient size to yield crystal spheres of respectable dimensions and mixed with river drift, sand, clay and with scattered smaller crystals, but whose origin is unknown. Fabulous stories come down to us of the size of quartz (*Crystallus*) masses, as that of Mohammed Ben Mansur who alludes to a merchant of Mauritania, having a basin "made of two pieces of crystal so large that four men could sit in it at once." (King.)

Looking at this attractive invention of Art, the story of Vidius Pollio comes to one's mind, how he ordered a boy who had broken a crystal to be thrown into his lamprey pond, and how Augustus punished him by commanding all vases of the kind to be destroyed in his presence, an arbitrary act that must have sent the coldest kinds of shivers up the backs of self-indulgent connoisseurs. In the days of the Former Empire the wealthy wore rings of quartz and ladies carried balls of crystal in their hands as a solace and a protection during summer heats. King quotes from the Greek:

Now courts the breeze with peacock feathers fanned,  
And now with ball of crystal cools her hand.

But the crystal ball has engendered the strange delusions of prophecy and clairvoyance, a strange tale of credulity and superstition, not always even by scientific writers regarded too scornfully. Crystal vision has a very ancient history. It was wide-spread in the Orient, and the Assyrians, Hebrews, Greeks and Romans practiced it. The topic is a strange and stimulating one taken in its connection with existence among savage or aboriginal cultures, and studied also on the side of its psychological significance. Who has not heard of the famous and erudite Doctor Dee?

Dr. Daniel G. Brinton in a paper on the folklore of Yucatan quoting a Spanish observer Garcia, writes that the wise men among the natives practiced a sort of divination through the use of a rock crystal and that it had an influence on the crops. Such crystals have been found buried in the ancient mounds of Arkansas, North Carolina and elsewhere, and it has been suggested that they appealed in some way to the Indians and may have possessed a talismanic virtue in their eyes.

So prolific of suggestion and so knit in with civilized and historic associations is the simple text of this, our "Mystic Crystal Sphere," that its treatment could be indefinitely expanded. And when we think of the far more beautiful things which this same quartz, this "congealed breath of the White Dragon" has yielded under the sculpturing hands of artists, and still further recall its numerous other phases as onyx, amethyst and opal, this universal mineral becomes one of the most interesting of inorganic products.



CAVERN OF PLACARD (CHARENTE)

Especially rich in Solutréan industry, yielding the finest palæolithic examples of the art of chipping flint. These are lance points shaped like a laurel leaf, also willow-leaf points with a single lateral notch at the base

# CULTURAL PROOF OF MAN'S ANTIQUITY

THE STORY AS TOLD BY PALÆOLITHIC EVIDENCE IN EUROPE

By George Grant MacCurdy

THE antiquity of man is based on two general classes of evidence — human skeletal remains and examples of man's handiwork. Either class alone if properly dated is sufficient to prove man's antiquity. When both kinds of evidence are present and agree, as they do in Europe, man's antiquity is firmly established.

The record shows that man's cultural development has, like his physical evolution, been a slow process. Pre-history is not measured by dynasties, but rather by synchronizing industrial epochs and fauna with geologic periods and with glacial and interglacial epochs. The stone age is commonly divided into three great periods: eolithic, palæolithic and neolithic, each of these being subdivided into various epochs.

The range of the eolithic in the chronological scale is still a debatable question, and will probably continue so to be for an indefinite time owing to the difficulties in the way of drawing a hard and fast line between that which is natural and that which is intentional. No matter from what geological horizon they come, eoliths are alike in that they represent a common culture level. They are natural flakes, chips or nodules of flint that bear traces of utilization and of having been fitted to the hand; they are often retouched also in order to increase utility or lengthen its period. The artifact nature of the eoliths from the Upper Miocene (or Lower Pliocene) of Cantal, France, is still an open question.

The lower horizons of the palæolithic are characterized by the gradual evolution of the amygdaloid or almond-shaped type of stone implement. There are four of these horizons based on stratigraphy as well as on the evolution of the river-drift type of implement. With the Strépyan at the base of the Middle Quaternary appear the rudimentary *coup de poing* and the poniard. In the Chellean epoch the classical almond-shaped implement becomes well defined, although the scars left by chipping the two faces are still large and somewhat irregular with a portion of the nodular crust generally visible at the base. That which distinguishes the Acheulian from the Chellean is the regularity and fineness of the chipping, which is so skillfully done as practically to eliminate the zigzag nature of the edge formed by the meeting of the two chipped faces.

At the close of the Acheulian epoch there is evidence that man began to occupy caverns and rock-shelters, so that industrial remains are no longer confined to valley deposits. Each class of finds confirms and supplements the other although there is no direct stratigraphic relation between the superimposed floor deposits of the caves and those of the river valleys. The upper palæolithic series embraces four epochs: Mousterian, Aurignacian, Solutréan, and Magdalenian, to which may be added the Azilian or epoch

of transition. In respect to the stone art, flint flakes that are chipped only on one side dominate throughout. The typical Mousterian implements are the broad flake, one lateral margin of which is employed as a scraper, and the pointed flake. The first traces of a bone industry also make their appearance in the Mousterian. The ushering in of the Aurignacian epoch is marked by important changes. The dominant flint implements include bladelike flakes with one end chipped obliquely and the back worked down for its entire length, also flakes chipped along both margins, producing in some instances hourglass forms. Bone scrapers terminating in an oblique edge and bone points with cleft base occur. By far the most important contribution of the Aurignacians was in the line of sculpture, engraving and painting.

The finest palæolithic examples of the art of chipping flint are the Solutréan lance points in the shape of a laurel leaf, and the willow-leaf points with a single lateral notch at the base. Bone, ivory and reindeer horn were largely employed by the Magdalenian races, who invented the barbed harpoon and the spearthrower. The first harpoons had only a single row of lateral barbs, short at first. These gradually lengthened producing a new type. In the upper Magdalenian deposits, appear the harpoons with two rows of barbs and an enlargement near the base to make secure the attachment of the cord.

The arts of engraving and fresco reached their culmination in the Magdalenian. On the other hand the flint industry of this epoch is largely confined to slender bladelike flakes, some retouched at one end to form a duck-bill scraper, others beveled at the end and destined for graving tools. Evidence that the races of the upper palæolithic buried their dead continues to accumulate. During the month of August, 1912, I took part in the disinterment of two Mousterian skeletons (children), at La Ferrassie (Dordogne). The bodies were placed in pits that had been sunk into Acheulian deposits.

The art of the caverns and rock-shelters consists of sculpture (in the round, and high and low relief), engraving and painting. These all had their beginnings in the Aurignacian epoch. The first discoveries were made in the floor deposits: statuettes carved in ivory and stone; engravings on stone, bone and reindeer horn; spear throwers of ivory and reindeer horn artistically decorated with figures of game animals, incised as well as in the round; and engraved batons of reindeer or stag horn.

Cave art during the closing epochs of the palæolithic is seen at its best in mural engraving and fresco, so many examples of which have come to light in Spain and southern France. These escaped the notice of archæologists for many years after the art products of the floor deposits had become well known. The first discovery was made at Altamira, in the province of Santander, Spain. One day in 1879, Marcellino de Sautuola was digging for relics in the floor of this cavern. His daughter who had accompanied

him, chanced to look up at the low ceiling and there beheld polychrome figures of strange animals. Her cry of excitement brought the father, who seemed to divine from the beginning the true meaning of these remarkable figures. The next year Sautuola published a paper on the subject. The palæontologist, Harlé of Bordeaux, came to see but went away unconvinced. Sautuola's paper, received with skepticism by the scientific world, was forthwith forgotten. In 1895 Rivière found engraved figures on the cavern walls of La Mouthe (Dordogne). The next year Daleau found similar figures at Pair-non-Pair (Gironde), which was followed in turn by still more important discoveries at Les Combarelles and Font-de-Gaume (Dordogne), the latter containing polychrome figures



Rock shelter of La Ferrassie (Dordogne), extending from the roadway to a point corresponding to the extreme right in the picture. Only a small portion has been excavated

exactly like those at Altamira. Sautuola died without knowing that the authenticity of the Altamira frescoes had been confirmed by similar ones in France. There is a street named in his honor at Santander but his most enduring monument will be Altamira.

The cumulative evidence in favor of the authenticity of these palæolithic wall engravings and frescoes is now overwhelming. Briefly it is this: The animals represented belong to species either extinct or no longer to be found in those regions. The floor deposits are of palæolithic age and these contain figures in the round, in relief or engraved, representing the same fauna and in the same style of art. Some of the mural decorations were covered by accumulated floor deposits of palæolithic age (Pair-non-Pair, La Grèze,

Teyjat, Laussel). Caverns that were accidentally sealed at the close of the Quaternary or Pleistocene by falls of earth and rock, when opened, are found to contain these parietal works of art (Altamira, La Mouthe, Bernifal, Gargas, Niaux). In caverns that have been open continuously from the palæolithic to the present time, if there are any parietal figures, there are always vestiges of palæolithic culture in the floor deposits (Font-de-Gaume, Venta de la Perra, Covalanas, La Haza, Salitré, Castillo, Santian, La Pasiega Hornos de la Peña, etc.). On the other hand when vestiges of neolithic culture only are present, there is never any parietal art.

The list of caverns and rock-shelters with palæolithic mural decorations increases from year to year. One of the most notable additions to the list during 1912 is the cavern of Tuc d'Audoubert, near St. Girons (Ariège), discovered on July 20th by Count Begouen and his three sons. The present entrance is by a subterranean stream bed, that of the Volp. By means of an improvised canoe Count Begouen and his sons ascended the stream bed for a hundred meters; by walking and bridging they continued for a like distance, when they found a small opening which they entered by means of a short ladder and which led into a great gallery hung with myriads of cream white stalactites and stalagmites. Traversing this they entered other corridors leading to other galleries equally beautiful. In a corridor they found engraved figures of various animals. One gallery was reached only after the breaking away of large pillars of stalagmite. In it they found skeletal remains of the cave bear, from the jaws of which all the canine teeth had been extracted to serve as ornaments or otherwise. A few flints and a perforated tooth (Bovidae) were picked up from the cavern floor. Imprints of human feet (bare) were seen in some places superimposed on footprints and claw marks of the cave bear. At the very end of this gallery and nearly a kilometer from the entrance to the series of galleries traversed, Count Begouen found two figures of the bison modeled in clay — a female followed by a male, sixty-one and sixty-three centimeters in length respectively. They seemed to rise from the sloping earth out of which they were fashioned. Near were human heel prints suggestive of a ceremonial dance.

This was evidently a palæolithic shrine and symbolizes, as does the whole remarkable manifestation of cave art, the passing of a culture whose food supply was based on hunting and fishing. This art was called forth in response to an economic need and incidentally to satisfy an æsthetic sense. As the population increased — and no one who has visited the Vézère valley for example can fail to be impressed by the evidence pointing to a relatively dense population — the game decreased in ratio. In order to readjust the supply to the demand recourse was had to magic. The animal figures are votive offerings for success in the chase and for the multiplication of game. In the end magic was bound to fail. It was superseded by the domestication of animals and plants which appeared with a new culture, the neolithic.



# THE PICTURE WRITING OF THE AZTECS

WORDS ARE REBUSES MADE UP OF CONVENTIONALIZED  
PICTURES AS SYLLABLES

By Herbert J. Spinden

THE Aztecs of Mexico City wrote books upon durable paper made from the matted fiber of the maguey afterwards covered with a coating of fine lime. These books, commonly called codices, consist of long strips folded screen-wise and usually have writing on both sides. Among the Maya of Yucatan, book-making probably reached a higher plane than among the Aztecs but the interpretation of symbols is much more difficult. In both regions, the Spanish priests were instrumental in destroying large quantities of the native documents in their attempts to stamp out pagan beliefs.

In the valley of Mexico however, the art of writing was able to maintain itself for some time after the conquest. There are a number of Aztec books or codices which contain European writing in explanation of the Mexican figures and these have been of great value in the study of other documents. The list of pre-Cortesian manuscripts is small, but there are many which date from soon after the coming of the Spaniards and these preserve in greater or lesser purity the original style of writing.

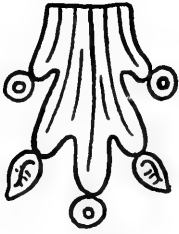
As regards the subject matter, codices contain historical and religious information of several sorts, which is imparted in a system fundamentally different from ours. The Mexicans did not have an alphabet or even a formal syllabary. Their method of writing is in part pictographic and in part hieroglyphic.

Aztec writing can best be compared to the so-called "rebus puzzles" which consist largely of pictured puns upon whole or partial words. The hieroglyphs are practically limited to place names, personal names, month and day names, numbers and principal objects of commerce. There are no word pictures for adverbs, adjectives or conjunctions, and no representations of abstract ideas. Such hieroglyphs for example as the Chinese symbol for "danger," which represents a child standing on the edge of a cliff, are unknown. Some of the signs are in no degree realistic and have a definite meaning by common consent alone, while others are abbreviated and conventionalized pictures of objects. Thus the head of a god or of an animal frequently appears as the sign of the whole. But the most important and interesting word signs are, as before remarked, rebuses in which separate syllables or groups of syllables are represented by more or less conventionalized pictures. The whole word picture is then made up of syllable pictures which indicate phonetically the word as a whole but which may have no definite relationship to the meaning of the word.



#### FAMILY TREE OF THE ANCIENT MEXICANS

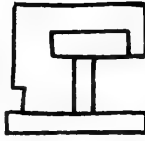
Photographed from a drawing on native paper made from the maguay plant. The principal or ruling persons sit on chairs or thrones covered with matting. Others sit on stools or kneel on the ground. The names of the individuals are usually indicated by hieroglyphs attached to the head or to the chairs. Some figures which may represent children have no recorded names.



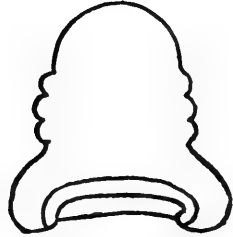
*a* from *al*, water



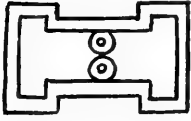
*te* from *tell*, stone



*cal* from *calli*, house



*tepe* from *tepell*, mountain



*tlach* from *tlachtli*, ball court



*pan* from *pantli*, banner



*itz* from *itzili*, obsidian



*tlan* from *tlantli*, teeth



*miz* from *miztli*, cloud



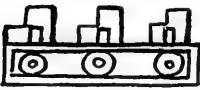
*apan* from *apanli*, canal



*quiauh* from *uill*, rain



*quiauh* from *quauil*, tree



*tenan* from *tenamill*, wall



*tia* from *tlalli*, ground or *mi* from *milli*, cultivated ground



*petla* from *pellal*, matting

The figures on this page give certain elements that enter into many words. The phonetic value is in the root of the name and this root is usually obtained by cutting off the endings *tl*, *li*, *tli* or *in*. In each case the phonetic symbol is a conventionalized picture of the original word.

Examples are also figured of compounds of two or more of these pictures with a greater or less degree of running together of details. One hieroglyph translated *Atepec*, is composed of *a* (water) and *tepe* (mountain). The ending *e* or *co* which means in, on or by, is unrepresented by a phonetic element in this and most other words where it occurs. Similarly *Caltepec* is composed of the two pictures, *cal* (house) and *tepe* (mountain). *Itztepec* and *Panttepec* are made in the same manner with substitution for the first syllable of *itz* (obsidian) and *pan* (flag). Actually the last example means "on top of the mountain" rather than "flag mountain," the pun for once playing a useful part.

The next three place names show the constant element *tlan*. As a matter of fact this syllable is a postposition meaning near, under or between, but it is regularly pictured by two conventionalized teeth. *Itztlan*, *Mixtlan*, and *Petlatlan* present the simplest sort of combination picture elements.

In one hieroglyph we see the combination of *a* (water) and *tenan* (wall) to make *Atenanco*. Two others have as the fundamental part a plan of the ball court in which the ancient Mexicans played a sort of basket ball. The object of the game was to throw the ball through a ring in the center of the wall on each side. *Tlatlachco* shows this ball court, *tlach* laid out in a field, *tla*, and *Tlachquiauhco* finds it covered with raindrops, *quiauh*.

The combinations may be more puzzling through the running together of details. *Tecalco* is a house ornamented with the characteristic markings of conventionalized stones and thus has *te* plus *cal* as the essential parts. To go a step farther in *Tepetlacalco* we see a house, *cal*, made of mats, *petla*, and with stones, *te*, beneath and on top.

The hieroglyph of the ancient Aztec capital, translates *Tenochtitlan*. The essential parts are a stone, *te*, out of which grows a cactus, *noch*. The last two syllables are unrepresented. The *ti* is only a connecting syllable but the *tlan* might easily have been given by pictured teeth. This hieroglyph forms a part of the Mexican coat of arms. The eagle which is commonly perched above the cactus has a mythological rather than a phonetic import. *Popocatepetl* is represented by a smoking mountain. The ancient name of Orizaba was *Ahuilizapan* (by the joyful water). The hieroglyph represents a man disporting in a stream, *apan*.

Besides the signs that have been given there are many others representing animals, reptiles, birds, plants, etc. The serpent *coatl* appears in many place names such as *Coatepec* and *Coacalco*, with the definite phonetic value *coa*.

There are other hieroglyphs that contain a greater element of imagination and belong to the type known as ideographs. The word-ending *nahuac* really signifies "near" but it resembles the word *Nahua* which means "clear sounding" and was taken by the Aztecs and related tribes as a general name for themselves. Now in the word *Cuauhnhuac* (the modern Cuernavaca) the first half of the word is represented by a tree, *quauh*. In the trunk of this tree is a mouth and out of the mouth issues a blue word in the shape of a scroll. Thus we have "clear speech" figured. In *Acolnahuac* it is an amputated arm that has the mouth and utters the clear sound. The same idea is amplified in the place name *Cuicatlan*, "the place of singing." A human face is shown with open mouth and in front of this is a decorated scroll that represents song.

Color and position may play a part in the hieroglyph. In *Acocozpan* the first and last syllable are represented phonetically by the stream *apan*. The *cocoz* which means very yellow is represented by the color of the water in this pictured stream. *Itzmiquilpan* has its first syllable represented by an obsidian knife seen at the top of the hieroglyph. The second syllable *mi* comes from the strip of cultivated ground at the bottom; growing out of this ground is a green curved plant which represents the syllable *quil*, the name *quilitl* being given to one of the herbs eaten by the Aztecs. Finally the



Atepec



Caltepec



Itztepec



Pantepec

MEXICAN PLACE NAMES SHOWING SIMPLEST COMBINATION OF DISTINCT PHONETIC ELEMENTS. THE ENDING C (OR CO) WHICH SIGNIFIES IN, ON OR BY IS USUALLY UNREPRESENTED IN HIEROGLYPHS



Miztlan



Itztlan



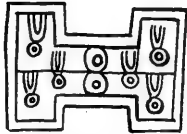
Petlatlan

THREE NAMES OF MEXICAN LOCALITIES. SIMPLE COMBINATIONS OF PICTURE ELEMENTS



Tlatlachco

A ball court laid out in a field



Tlachquiauhco

A ball court covered with rain



Tecalco

A house of stones



Tepetlacaico

A house made of mats and stones

PLACE NAMES SHOWING A CLOSE ASSOCIATION OF PHONETIC ELEMENTS



Tenochtitlan

*Te* (stone) out of which grows *noch* (cactus). Last two syllables not represented



Popocatepetl

"A smoking mountain". The snowy summit is indicated



Ahuilizapan

"By the joyful water." Ancient name for Orizaba

HIEROGLYPHS OF WELL - KNOWN PLACES IN MEXICO



Quauhnahuac

*Nahua* or "clear speech" represented by a simple scroll coming from a tree, *quauh*



Acolnahuac

"Clear speech" again, coming from the upper arm, *acol*



Cuicatlan

"The place of singing." Song represented by a decorated scroll

MEXICAN IDEAGRAPHS SHOWING REPRESENTATIONS OF SPEECH AND SONG



Acocozpan

First and last syllable *apan* (stream). *Coco* means very yellow, shown by color of water in the stream



Itzmiqulpan

On top, *itz* (obsidian); at bottom, *mi* (cultivated ground); *qul* (plant); *pan* (over), represented by position of obsidian over plant

HIEROGLYPHS IN WHICH ELEMENTS OF COLOR AND POSITION ARE BROUGHT IN WITH PHONETIC VALUE



Huitziluhuitl

*Huitzil* (humming bird), *ihuitl* (feather)



Chimalpopoca

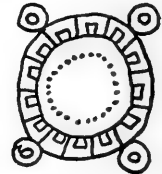
*Chimal* (shield), *popoca* (smoking)



Axayacatl

*A* (water) *zayacatl* (face)

HIEROGLYPHS OF MEXICAN RULERS



[From left to right] 1. 20 cocoa beans; 2. 400 bowls of corn mush; 3. A sack of gold; 4. A roll of paper; 5. Chalchihuitl or sacred green stone

NUMBERS AND ARTICLES OF COMMERCE

ending *pan* which means over, is expressed by the superposition of the obsidian knife over the plant.

The hieroglyphs representing personal names are not especially different from those representing places. It might be interesting to examine the names of two or three of the Aztec kings. The second, third and sixth kings of Tenochtitlan of Mexico City were Huitzilihuitl (1396-1417), Chimalpopoca (1417-1427), and Axayacatl (1469-1482). The hieroglyph of the first is the head of a humming bird, *huitzilin*, with a feather, *ihuitl*, in its mouth. That of the next ruler is a picture of a smoking shield as the name signifies. The last name is that of a fly that lives on the lake. The translation of the name is "the face of the water." The hieroglyph represents a human face with a stream of water running down over it.

The day and month signs of the Aztec calendar are well known. For the most part they are heads of animals and birds. The signs that signify numbers are not very numerous. The common articles of commerce are represented by symbols sometimes realistic, sometimes not. The sign for gold occurs in many documents as does that which means *chalchihuitl*, the sacred green stone.

Several of the Aztec documents dealing with migrations and conquests of the Aztecs resemble old-fashioned maps, the sequence of events being indicated by a line of footprints leading from one place or scene of action to another. The places or towns in these documents are represented by hieroglyphs and often the character of the country is indicated by pictures of typical vegetation such as maguey plants for the highlands and palms for the lowlands. The symbol of the beginning day of the year in which took place the foundation of the town — or whatever event is intended to be recorded — is usually placed beside the hieroglyph or picture of the place or event. A hieroglyph with a spear thrust into it signifies conquest.

Genealogical records resembling our family trees were also in use, as may be seen from an example in the American Museum. In nearly all cases a hieroglyph that represents the name of the individual is placed above him. Other common records had to do with the tribute paid in by various towns and districts to Mexico City. The so-called "Tribute Roll" of Montezuma is a record of the cities and towns that were under the sway of the Aztecs when the Spaniards arrived on the scene. In this book are shown not only the place name hieroglyphs of the conquered peoples but also the sorts of tributes and the amounts collected.

The codices dealing with religious matters are more largely pictographic than are the historical records. Ceremonies such as sacrifices are represented by realistic pictures. The so-called "*Tonalamatl*" is one of the most important things represented in the religious codices. This is a sacred period of 260 days, the various subdivisions of which are under the rule of particular gods.



A walrus herd on a floating ice cake. Eskimo hunters on a neighboring ice cake shoot the walrus one by one as the heads are lifted. The report of the rifle causes no alarm among the herd perhaps because walrus are accustomed to similar sounds made continually by the ice



Great herds of females with their young drift northward in the ice fields. It is at this time that hunters, both Eskimo and white men, carry on the wholesale slaughter. The laws of Siberia and the United States prohibit the killing of the walrus within three miles of land — where the walrus is seldom if ever found. Because of this inadequacy of the law, the species is certain to be exterminated within a very few years



## SHALL THE WALRUS BECOME EXTINCT?

By Joel Asaph Allen

THE walrus is doomed to early extinction like many other large mammals, hunted as game or for their commercial products. This will be true unless provision for their protection be soon made by international agreement, prohibiting their slaughter for commercial purposes or for trophies, and making the sale of such products illegal. As the accomplishment of such an agreement and provision for its strict enforcement will naturally require a considerable period even in this age of conservation sentiment, the matter cannot be taken up too soon nor too earnestly to secure the preservation of the remnants of the former vast herds of one of the most specialized and interesting types of mammal life.

The following practical facts supplied by Mr. Beverly B. Dobbs of Nome, Alaska, eye witness for many years of the slaughter of the walrus, are of peculiar value as an incentive to action.

Walrus are greatly prized for their heavy pelts and ivory by the Eskimo of northwestern Alaska and northeastern Siberia. As the time approaches for the giving birth to the young, the females withdraw from the general herd and drift along toward the Arctic Ocean with the great ice fields, which each year begin movement toward the Pole about May 15. Until the middle of September great herds of these females with their young are found in these waters. I have often seen as many as ten thousand within three miles of our boat and it is during this time that the hunters, both Eskimo and white men, conduct a wholesale slaughter of the animals. During the hunting season the Eskimo keep their large skin boats or umiaks on stanchions out near the edge of the shore ice. Watchers are stationed at advantageous points where they may quickly detect a herd on a passing ice cake and give the signal to the village. Immediately upon receipt of the good news all available men rush to the boats, mount them on runners made of inflated sealskin pokes and push out over the rough ice into the open water.

Keeping the walrus to the windward the Eskimo in the boat stealthily approach to within a few hundred feet of the herd, which may contain five or six hundred animals. Then climbing on a neighboring ice floe, they lie low and patiently wait until some walrus raises its head above the others. When this occurs a shot rings out, the head drops and the Eskimo settle down to await the appearance of another unprotected head. In this way an entire herd may be annihilated without one animal leaving the ice floe. Strange though it may seem, the loud report of the rifle causes no alarm among the herd. This is possibly due to the fact that fissures forming in the ice often produce sounds similar to the report of a gun and the walrus being accustomed to these sounds pays no heed to them. Should the animals get a scent of the hunters, they would plunge headlong into the open sea and in the scramble only a few would be captured. A bullet lodged in the body of the walrus instead of the head will not prevent escape into the water.

Another method of hunting, which is employed mainly by the American native, is conducted along more hazardous lines: Fifteen or twenty natives armed with

repeating rifles creep up to a herd, then make a rush, firing right and left. This method is considered unsatisfactory, as many of the animals get away even if they are shot or plunge off into the open water where they sink. Should they be harpooned before sinking, they must be hauled back on the ice field again before they can be skinned, and considering the fact that one walrus weighs from fifteen hundred to six thousand pounds, getting it on the ice again is no small undertaking.

After as many of a herd as possible have been killed, the walrus are placed in a row ready for skinning. The ivory tusks are removed and saved, also the tail and flippers, the latter when cooked being considered a delicacy by the natives. The hide is used for making boats, towlines, lashing for sleds and soles for boots. In Siberia it is used also for the roof and sides of the summer igloo. Both the hide and



On receipt of the good news of a passing walrus herd on an ice floe, the men mount the boats on runners made of inflated sealskin pokes and push out over the ice into the water

ivory are often exchanged to white traders for tobacco, coffee, tea, sugar, ammunition and guns, which the natives have learned to use and appreciate.

Trading companies employ the natives to hunt for them, paying them with the tails, flippers and half of the ivory. Raw walrus hide brings ten cents per pound in the Pacific coast markets and is used in the manufacture of trunks, purses, suitcases and also in the making of buffing wheels used in the rough finish of cutlery. The ivory is worth from sixty-five cents to one dollar per pound.

Both Siberia and the United States have laws which are supposed to protect the walrus, but these laws are of little value. They prohibit the killing of walrus within three miles of land while as a matter of fact, the animals are rarely or never found that close to land. Owing to the inadequacy of these laws and the almost universal use of modern firearms among both Eskimo and white hunters, extermination of the walrus will be accomplished in a few years unless steps are immediately taken for effective protection.

The walrus constitute one of the three families of aquatic carnivorous mammals, the pinnipeds or fin-footed animals, the other two families being the common seals and the eared seals. The walrus are similar in limb structure to the eared seals, that is the fur seals and sea lions, but have much thicker bodies and are very different in the form of the skull modified to afford support for the upper canine teeth, which as enormously developed tusks, form the most striking feature of these ponderous beasts.

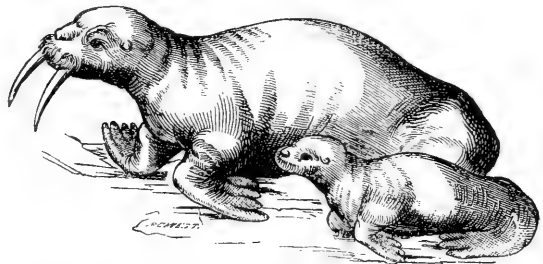
Unlike fur seals, sea lions and the true seals, the walrus are at present restricted to coasts and islands situated north of the Arctic circle; in fact they never ranged very far southward. About the middle of the sixteenth century the Atlantic walrus was found as far south as Nova Scotia, but during the last half of the eighteenth century they were practically exterminated from the various islands to which they resorted in great numbers in the Gulf of St. Lawrence and from Sable Island off the southern coast of Nova Scotia where thousands were killed annually for their oil, hides and tusks. For the last hundred years only stragglers have been seen as far south as the Labrador coast.

On the other side of the Atlantic the walrus in early times ranged south as far as the coast of Scotland and the Hebrides, but apparently not in large numbers, their main resort being the islands north of Norway especially Bear Island, Spitzbergen and Nova Zembla, where the same war of extermination has been carried on for more than three centuries till now only a few are left of the former great herds.

Fossil remains of the Atlantic walrus have been found on the coasts of New Jersey, Virginia and South Carolina, showing that in glacial times it must have ranged much farther south than the points where it was found by the early explorers of North America. Remains of walrus, or



From the middle of the sixteenth century until the middle of the nineteenth, the walrus has figured in many fantastic ways of which this armor-wrapped creature with swinish head is a typical example



The first truthful figure of walrus, by Gerard, 1613, and the only one for the next 250 years, until in 1853 a living walrus was brought to London and the truth of the Gerard picture was proved

their immediate ancestors, have been found also in England and Belgium.

The Pacific walrus is restricted to a comparatively small extent of the northern coasts of Asia and North America and the islands of the Bering Sea, its northern limit being the unbroken polar ice. This species formerly resorted to the Pribilof, St. Matthew and St. Lawrence islands, and to portions of the coast of Alaska, but their numbers have been greatly reduced during the last half century. It is stated on the highest authority that for several years preceding 1870 about one hundred thousand pounds of walrus ivory was taken annually, involving a destruction of not less than six thousand walruses. Later statistics show that for many years following this date the catch of walrus in Bering Sea was not far from ten to twelve thousand annually. The wholesale slaughter continued until the herds became so reduced in numbers that their pursuit was commercially unprofitable. This destruction was additional to the number usually killed by the natives to supply their domestic needs and for barter.

The walruses hold a picturesque place in the annals of natural history, being in early days the subject of many marvelous tales and fantastic pictorial representations. Even the tusks, which were always described as a prominent feature, were in some instances placed in the lower jaw and directed upward, and the hind feet were turned backward as in the common seal instead of forward. The early systematists assigned them to the class of fishes, with the whales and manatees, in accordance with their aquatic mode of life. Although left in the class of fishes by Linné as late as 1758,



From the Museum's walrus group

they were recognized by various writers as true mammals long before the whales and manatees were dissociated from fishes; but they were still assigned to most unnatural relationships. Various writers as late as the close of the eighteenth century were unaware that the walrus had hind feet; and close relationship to the Carnivora was not

fully recognized till toward the middle of the nineteenth century.

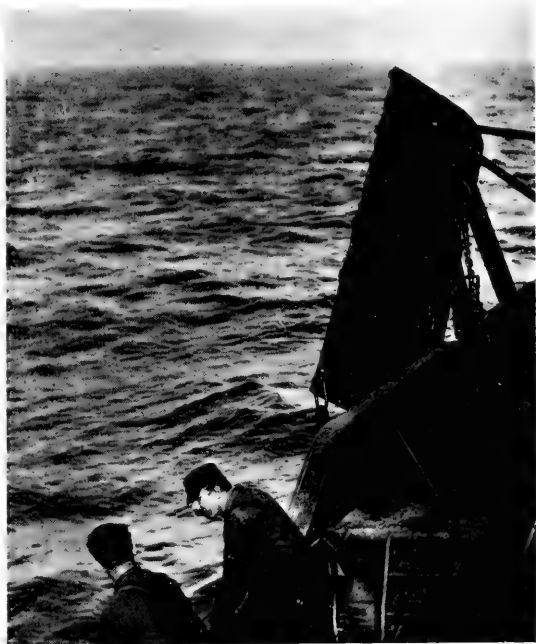
# FISH FROM DEEP WATER OFF NEW YORK

By John T. Nichols

THE "steam trawl" introduces a method of capture for salt water fishes which, though much in vogue in Europe, is only just gaining a foothold on our Atlantic coast. By the new method, small powerful steamers drag huge nets over the bottom in deep water, sometimes catching several thousand pounds of fish in one net. Six of these trawlers are now operating out of Boston but none came regularly to the New York market previous to November of the past year. Fortunately the Museum's department of fishes was at that time invited by the Heroine Company to send a representative on the first New York trip of such a trawler.

The primary object was to locate near the New York City market good fishing grounds for cod, haddock or other valuable bottom fishes. Although in this, the initial experiment was a failure, the exceptional opportunity to investigate deep waters brought to light interesting forms — and especially was material of value secured for the Museum. For example many smooth scallops (*Pecten magellanicus*) were brought to the surface fifty miles south-east of New York in twenty to thirty fathoms of water, and between the valves of some of them a single small hake was found, as has sometimes been previously reported by naturalists. It would be interesting to know if this fish customarily takes refuge within the shell of the mollusk.

Further southward and eastward in sixty to eighty-five fathoms on the edge of the continental shelf, many deep water fish were taken. The tile-fish was there in small numbers; bright red, deep-water gurnards (*Peristedion*) were common. One of the latter mounted and



After the net has been dragging over the sea bottom, the ends, equipped with heavy wood and iron "doors," are drawn up by machinery, one to either end of the boat, and the laborious task commences of getting the center of the net containing the fish aboard the steamer



A large hake from the catch. The fish from the net are all dumped in a pile on the steamer's deck, to be dexterously sorted with pitch forks, cleaned and tossed below, where they are immediately buried in ground ice so that they will reach the market in good condition

placed in the systematic fish collection is a very showy specimen, but it should be remembered that in its natural environment there are so few red rays left in the sunlight which penetrates the mass of blue-green water, that the red color of the fish cannot show.

In latitude  $39^{\circ} 39'$  north and longitude  $72^{\circ} 07'$  west, *Zenopsis*, a little-known deep-water relative of the European "John Dory," was found. When a cast of *Zenopsis* is placed on exhibition, a direct comparison with the European fish can be made. In the same locality was taken a single specimen of the small rare

shark *Catulus retifer*, so-named from the delicate netlike color pattern on its back and sides. Two flounders, *Paralichthys oblongus* and *Limanda ferruginea*, previously not contained in our collection, also proved to be common in deep water within fifty miles of New York.

Observations of no less interest were made on other commoner fish also. The Carolina sea robin and the fluke which abound in our bays in summer were found scattered in the deep water off shore, indicating that with colder weather they migrate into the depths. We caught a single alewife along the Long Island shore. This species of herring with other similar fishes formerly ascended our fresh water streams to spawn in incredible numbers, which have gradually decreased on account of the damming and pollution of coastwise streams. A number of years ago Professor Baird attributed the decrease of cod which has gone on off the New England coast, not to over-fishing but to decrease in these smaller fishes which used to fill the waters adjacent to the streams where they spawned throughout a great part of the year and which formed an important factor in the cod's food supply.

The facts gleaned on this short trip with the steam trawl point out the importance of a thorough study of our local fishes, which it is hoped there will soon be opportunity to undertake.

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Patron*, MR. CLARK LOMBARD RING;

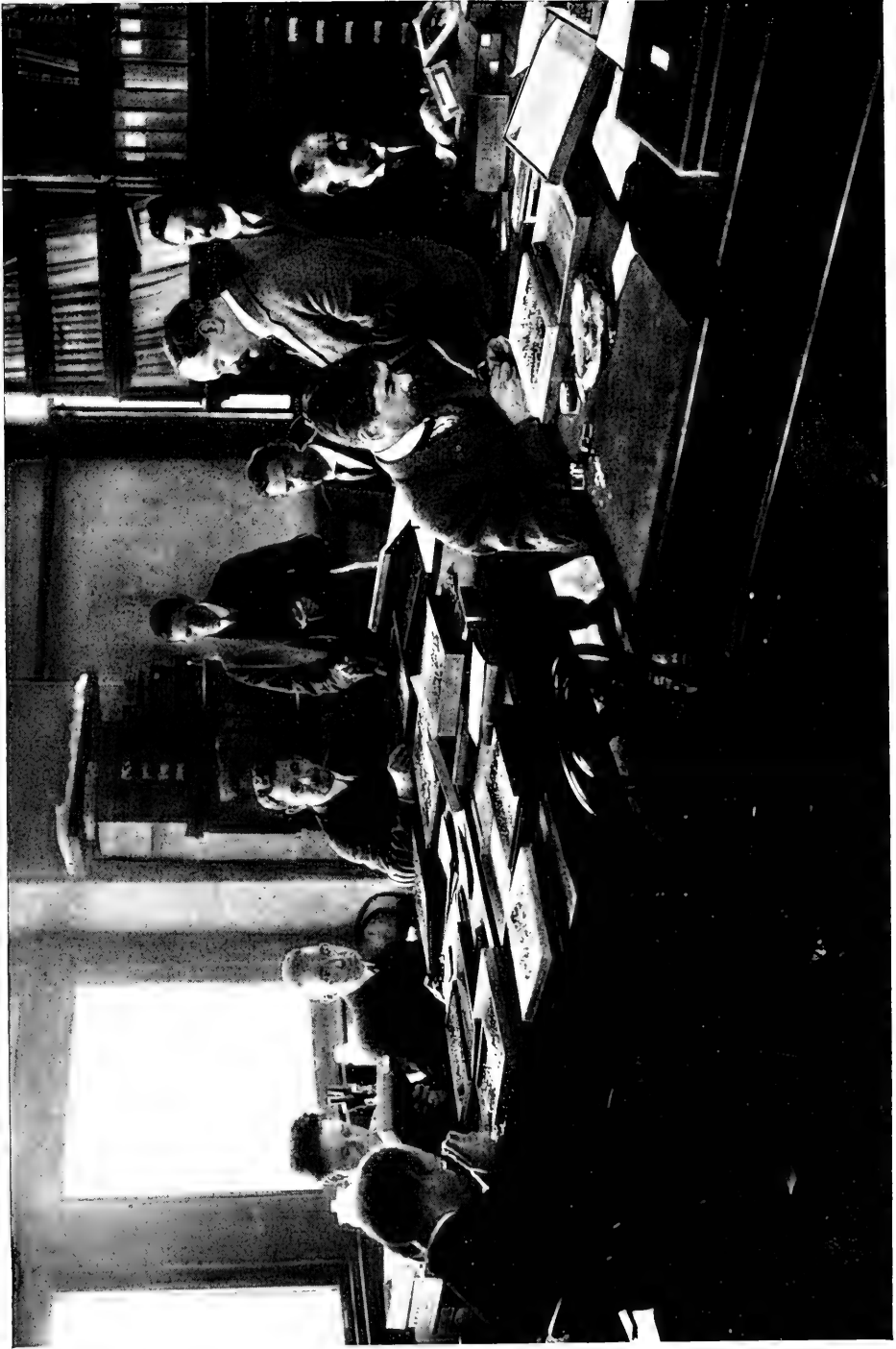
*Fellow*, MISS CAROLINE L. MORGAN;

*Life Members*: MRS. WILLIAM ARMSTRONG, MRS. GEORGE B. CASE, MRS. HERBERT PARSONS, MRS. WILLIAM DOUGLAS SLOANE, MRS. CORNELIUS ZABRISKIE, DR. WILLIAM T. HORNADAY and MESSRS. VINCENT ASTOR, JULES S. BACHE, EDGAR DEAL, CHARLES L. FREER, and B. F. PANKEY;

*Sustaining Members*: MRS. J. HENRY DICK, MRS. JAMES DOUGLAS, MRS. FRANK M. LUPTON, MRS. BEULAH S. OPPENHEIM, MRS. CORNELIUS VANDERBILT and MESSRS. HENRY BENDHEIM, CONRAD HUBERT, JULIUS KAYSER, and OTTO MARON;

*Annual Members*: COUNTESS DE LAUGIER-VILLARS, MRS. EMMA B. ANDREWS, MRS. S. REED ANTHONY, MRS. J. HULL BROWNING, MRS. LEOPOLD CAHN, MRS. JOSÉ E. CHAVES, MRS. A. W. COLGATE, MRS. J. DANNENBERG, MRS. MATTHEW B. DU BOIS, MRS. W. N. FREW, MRS. ALBERT GALLATIN, MRS. M. GOLDFRANK, MRS. WALTER S. GURNEE, MRS. LEIGH HUNT, MRS. BRADISH JOHNSON, MRS. EDWARD KING, MRS. PAUL LICHTENSTEIN, MRS. FRANCIS NEWTON, MRS. C. H. NICHOLS, MRS. M. TAYLOR PYNE, MRS. Z. VAN RAALTE, MRS. T. DOUGLAS ROBINSON, MRS. SOLOMON STEIN, MRS. WILLIAM STRAUSS, MRS. CHARLES APPLETON TERRY, MRS. J. METCALFE THOMAS, MISS S. GRACE FRASER, MISS CLARA C. FULLER, MISS ISABELLA C. KING, MISS ELIZABETH McLANE, MISS C. E. MASON, MISS JULIA RYLE, MISS FANNY A. SMITH, MISS ELIZA A. THORNE, MISS JOSEPHINE WISNER, GEN. TASKER H. BLISS, HON. IRVING LEHMAN, REV. WILLIAM M. FINCKE, DR. EDWIN BEER, DR. WILLIAM A. DOWNES, DR. J. G. FULTON, DR. W. TRAVIS GIBB, DR. ALFRED F. HESS, DR. F. K. HOLLISTER, DR. E. L. KEYES, DR. HIRAM N. VINEBERG, DR. ISAAC WEIL and MESSRS. BENJAMIN ADAMS, ABRAHAM W. AST, A. VICTOR BARNES, WILLIAM M. BARNUM, LLEWELLYN BARRY, JEREMIAH BEALL, MARTIN BECK, HAMILTON BELL, ABRAHAM BIJUR, HIRAM C. BLOOMINGDALE, HOWARD S. BORDEN, DANIEL RICHARDS BRADLEY, A. BRESLAUER, RUDOLPH E. BRÜNNOW, M. N. BUCKNER, JONATHAN BULKLEY, WILLIAM BURNHAM, ERNEST T. CARTER, CÆSAR CONE, WILLIAM COVERLY, PAUL DANA, GEORGE S. DAVIS, E. MORA DAVISON, FREDERICK P. DELAFIELD, LYMAN DELANO, HENRY R. DIEDEL, JOHN A. DIX, GUSTAV FALK, WILLIAM C. FERGUSON, GUSTAV J. FLEISCHMANN, MACOMB G. FOSTER, HAROLD FOWLER, JOSEPH S. FRANK, D. J. FRANKEL, ARTHUR G. FREELAND, VICTOR FRIEDLANDER, LEON GOTTHEIL, ALBERT Z. GRAY, FREDERIC D. GRIMKÉ, THOMAS C. HALL, EDWARD HAMMERSLOUGH, SAMUEL HAMMERSLOUGH, SEYMOUR E. HEYMAN, LYMAN N. HINE, FRED HIRSCHHORN, F. H. HIRSCHLAND, JOSEPH HONIG, LEWIS ISELIN, DOUGLAS WILSON JOHNSON, DELANCY KANE, HENRY M. KEITH, ROLAND S. KURSHEEDT, EMIL LOEB, MAX MEYER, MORRIS MILLER, WILLIAM MOHR, ROBERT E. NOLKER, DAVID B. OGDEN, HENRY OLLESHEIMER, JUNIUS PARKER, CHARLES A. PLATT, DALLAS B. PRATT, D. H. McALPIN PYLE, GEORGE W. ROBBINS, BEVERLEY R. ROBINSON, FRANCIS ROGERS, M. ROOS, ALDEN SAMPSON, EVANDER B. SCHLEY, R. E. SIMON, THOMAS SNELL, ABRAHAM STEIN, LEONARD STEIN, J. ERNEST STERN, ALBERT STIEGLITZ, HERBERT N. STRAUS, SAMUEL STRAUSS, JULES TURCAS, SIGMUND ULLMAN, J. MANSON VALENTINE, EDWIN J. WALTER, R. L. WARNER, CHARLES WEINBERG, MAX WELINSKY, MAURICE WERTHEIM, CHARLES A. WIMPFHEIMER, and EDMOND E. WISE.

At a recent meeting of the executive committee, Captain Roald Amundsen and Admiral Robert E. Peary were elected honorary fellows of the American Museum of Natural History in recognition of their great contributions to the science of geography.



MEMBERS OF THE NEW YORK ENTOMOLOGICAL SOCIETY  
Working on the Collection of Local Insects in the American Museum of Natural History



DR. CLARK WISSLER and DR. ROBERT H. LOWIE of the department of anthropology attended the meetings of the American Anthropological Association at Cleveland, December 30 to January 3. President J. Walter Fewkes of the affiliated Anthropological Association being absent, Dr. Wissler presided at the meetings. Dr. Lowie read a paper on the "Ceremonies of the Eastern Sioux." Of the Museum staff, Dr. Herbert J. Spinden and Mr. Nels C. Nelson were elected to the council of the American Anthropological Association, and Dr. Lowie was made associate editor of the *American Anthropologist* and editor-in-chief of *Current Anthropological Literature*. Dr. P. E. Goddard was elected a member of the committee on a uniform alphabet for recording Indian language.

MR. FRANK M. CHAPMAN sailed January 8, on the steamship "Zacapa" of the United Fruit Company, in charge of an expedition to Colombia. He was accompanied by Mr. Louis Agassiz Fuertes as artist, and by Messrs. George K. Cherrie, formerly of the Brooklyn Museum, Paul G. Howes of New Haven, Connecticut, Thomas Ring of Saginaw, Michigan, and Geoffrey O'Connell of Ithaca, New York as general assistants. Mr. Chapman returns to South America to continue his studies of the Colombian fauna with the special object of ascertaining the limits of the various life zones, and also to secure material for a new habitat group of birds for the American Museum. It is designed that this group shall portray the Magdalena Valley with the snow peaks of the Central Cordillera as seen about Honda.

MRS. ELLA FLAGG YOUNG, superintendent of schools of Chicago, with a committee from the Chicago Board of Education recently visited the American Museum to study the institution's methods of coöperative work with the New York public schools, with a view to introducing a similar coöperation between the public schools of Chicago and the Field Museum.

CAPTAIN ROALD AMUNDSEN presents to the American Museum one of the sledges which made the trip with him to and from the South Pole. He gives it as an acknowledgement to the American people and especially to American scientific associations for the encouragement and assistance shown to him. This sledge makes a fitting companion to the sledge already in the Museum's possession, the "Morris K. Jesup," which accompanied Admiral Peary to the North Pole.

A report comes that the South Georgia Islands expedition under Mr. Robert C. Murphy reached the Bay of Islands, November 27 and was waiting for the sea elephant season to open in order to obtain the desired specimens for a Museum group of this Antarctic species. Mr. Murphy's statement that there were already on the ground twenty-one steamers representing seven commercial companies, mainly Norwegian, is discouraging for the future of the southern sea elephant race even with the close season set upon the species by the English. The South Georgia Islands expedition, made possible through the liberality of Mr. Arthur Curtiss James, hopes to obtain young penguins needed for completion of a penguin group under construction at the American Museum, in addition to sea elephants and a general collection of birds.

THROUGH Mr. Vilhjálmur Stefánsson the department of fishes has obtained specimens of capelin (*Mallotus villosus*), a delicious Arctic food fish allied to our smelt, from Point Barrow, Alaska, where they appeared in immense numbers in early August, spawning at the very edge of the sand. Mr. Stefánsson gathered from the residents at Point Barrow that the abundance and season of appearance of these

capelin were uncertain, that in fact the species was often absent during a considerable period of years. Although these are the first capelin of recent time which have come to the Museum, its collections for several years have contained fossil specimens of the same species from the Pleistocene of Canada.

DR. ROBERT H. LOWIE of the department of anthropology has been given the rank of associate curator, the promotion dating from January 1, 1913.

THE LINNÆAN SOCIETY OF NEW YORK held its first annual banquet at the Hotel Endicott on December 17. Mr. Frank M. Chapman in recognition of his unequalled services in popularizing ornithology, was the guest of honor and was presented with a medal. About sixty members and guests were present, Dr. Jonathan Dwight, Jr., president of the Linnæan Society, presiding. At the speakers' table in addition to Dr. Dwight and Mr. Chapman were Professor Henry Fairfield Osborn, Dr. Frederic A. Lucas, Mr. John Burroughs, Dr. A. K. Fisher, Mr. John H. Sage, Mr. Ernest Thompson Seton, Mr. T. Gilbert Pearson, Dr. George Bird Grinnell and Dr. Spencer Trotter.

DR. W. D. MATTHEW, MR. WALTER GRANGER and DR. WILLIAM K. GREGORY represented the American Museum at the New Haven meeting of the Palæontological Society, December 28-31, and contributed a number of papers to the proceedings.

By the death of the artist, Louis Akin, at Flagstaff, Arizona, on January 2, the Museum's plans for mural decorations for the Southwest Indian hall have received a check. Mr. Akin had been commissioned to prepare tentative sketches for sixteen panels and had made a number of preliminary figure studies with that end in view. He expected to have finished the sketches during the present year. It is hoped that it may be possible to exhibit Mr. Akin's studies during the spring months when there is proposed a special exhibit of material and paintings illustrating the life of the Indians of the Pueblo region. Mr. Akin is best known to the world by his paintings of Hopi Indians. His work is a faithful portrayal of the tribe, with which he lived during the years of his study and of which he was made a member.

LAST summer Mr. Walter Granger, associate curator of fossil mammals, sent in to the Museum a tiny fossil skull which he had found in a Basal Eocene formation in New Mexico. The specimen is of the greatest scientific interest as it belongs to an excessively rare and primitive group of Insectivora and carries back their record to the beginning of the Age of Mammals. But it was partly buried in a hard flinty nodule, the rock being harder than the delicate substance of the teeth and bone and not nearly as brittle. The whole skull is less than an inch in length, and to extricate it completely from its matrix without damage to the minute sharp-pointed teeth or the delicate structures of the skull is a remarkable accomplishment. It was not safe to employ acid or other chemicals to soften the rock; all had to be chiseled away, grain by grain, under the microscope with special tools devised for the work by Mr. Anderson. Enlarged photographs of the specimen were then secured and it was sealed up inside a small plate glass box and placed among the fossil Insectivores in the small mammal case in the Tertiary mammal hall.

THE department of invertebrate zoölogy has just acquired two notable additions to its collections. One contains representatives of one hundred and forty-two species of Neuropteroids, practically all of them being species not hitherto possessed by the Museum. It was obtained from Mr. Nathan Banks, a recognized authority on these insects. The other is a collection of thrips (Thysanoptera) obtained from J. Douglass Hood. Previously the Museum did not have a single well-determined example of this whole order; now it has a valuable and complete collection.

# The American Museum Journal

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MARY CYNTHIA DICKERSON, *Editor*

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A NEW MARINE GROUP SHOWING THE ANIMAL LIFE OF WHARF PILES

The old abandoned wharf, part of which is represented by a photographic transparency forming the background, is located at Vineyard Haven, Massachusetts, the cottages of which may be seen between the piles in the distance. In the foreground, the sea is represented as if in section to disclose the numerous sponges, hydroids, sea anemones, shellfish, ascidians and other sedentary animals with which the piles are crowded below the low water mark

—“Animals of the Wharf Piles,” page 87

# The American Museum Journal

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No. 2



## ARCTIC EXPLORATION AND THE NEW STEFÁNSSON EXPEDITION

By Robert E. Peary

**I**T becomes more and more an age of doing great things, of directing private, institutional and national wealth into channels for great results, and I am glad because of my keen interest in polar exploration, that some of the great things to be done are still to be found in the fastnesses of the Far North notwithstanding four centuries of interest and pioneer work.

Exploration has shifted decade by decade from one continent to another and from the Arctic to the Antarctic. The search for the North Pole was carried on many years before that for the South Pole began. Now both Poles have been attained, together with a large body of scientific fact, geographical and otherwise, brought back by the various exploring parties. The globe about the two Poles has held its mystery guarded most sternly of all the regions of the earth, especially about the North Pole where there is no land and the explorer can proceed in winter and earliest spring only, making hazardous journeys on shifting ice over unfathomed ocean depths. With all that has been accomplished, many hundred thousands of square miles still remain of the three million square miles of uncharted territory that existed prior to the expedition that resulted in the discovery of the Pole. To complete this exploration, to replace with knowledge the tradition and

theory accrued during past years is the step immediately before us and cannot fail to be of great value to science.

Of unexplored regions in the North, there are remaining but two of first importance: the inland ice cap of Greenland and the area represented by the large blank space on the map bounded by Bering Strait and the Pole, the western border of the Arctic Archipelago and the known open sea north of Siberia. The theories of cotidal experts have it that within this region lies an undiscovered Arctic continent, or a series of large islands separated by narrow channels, the whole not greatly distant from Banks Island, Prince Patrick Island and Grant Land (the western limit of the Arctic Archipelago), while tradition among the Eskimo and indefinite reports of whalers



*Reprinted from May Journal, 1912*

The north polar regions have sternly guarded their unknown areas with shifting ice over deep sea. Cotidal experts now maintain the existence of a land mass, possibly of 500,000 square miles, in what is represented as open polar basin immediately north of British America and west of the Arctic Archipelago

strengthen the theories in fixing the southern edge of the unknown land not far north of Point Barrow and the northern shores of America. I must believe in the existence of such land, one corner of which I saw from Cape Thomas Hubbard in July, 1906, in the mountain peaks of Crocker Land.

If land of large extent be located west of Banks Island and Grant Land, the discovery from the standpoint of future exploration will be of unusual importance, since the new land will be a base for penetration of the remainder of the unknown area to the west. In fact, since the theory of the existence of extensive land, one corner of which is Crocker Land and another not far

from Banks Island, seems so likely to me and is so well accepted by many expert geographers and mathematicians, I would divide the remaining greatest problem in the North into two separate problems — namely, the exploration of this land area and the exploration of the adjoining area beyond, between the Pole and Bering Strait.

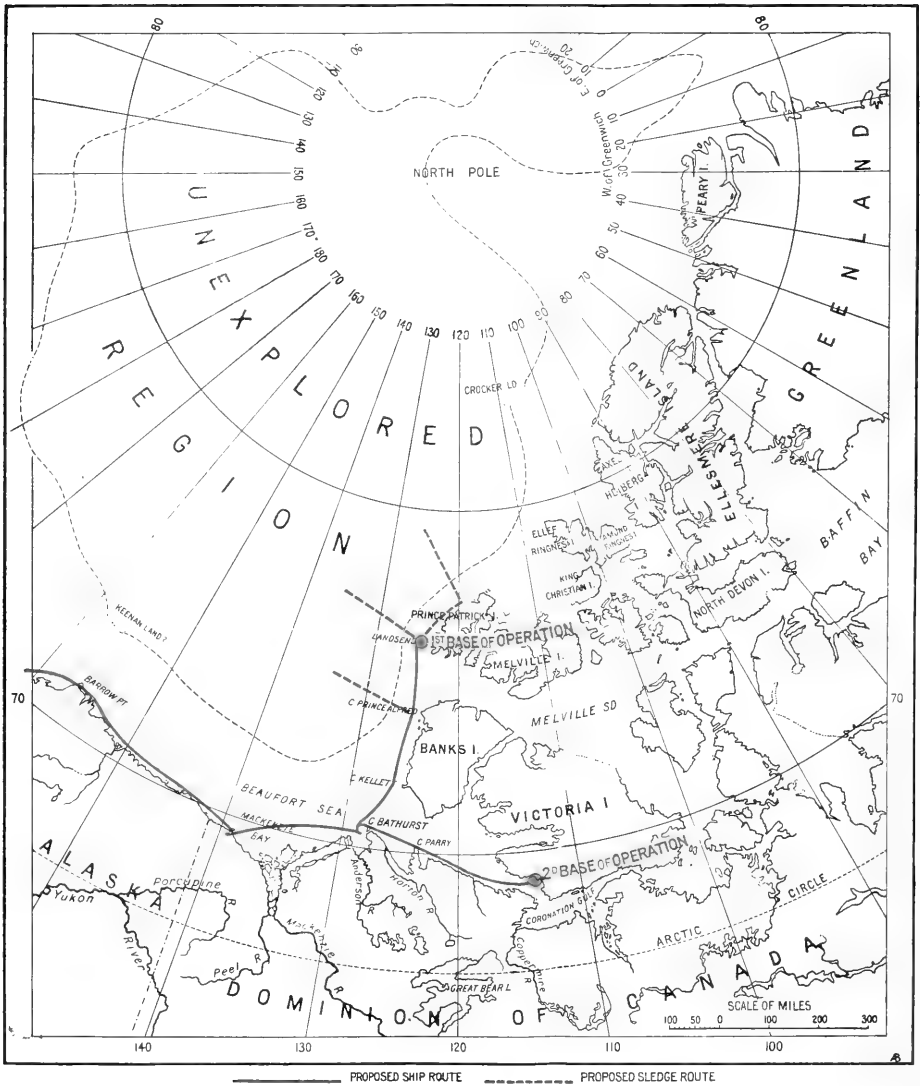
The eyes of the scientific world are on the projected expeditions which have for the geographical part of their work a search for this uncharted land. The Crocker Land expedition,<sup>1</sup> under the auspices of the American Geographical Society and the American Museum of Natural History, has been announced for more than a year, having had its activity deferred by the deplored death of George Borup, its prospective leader. An announcement is now definitely made that the Stefánsson expedition reported some months ago as likely to proceed on polar investigations under the auspices of the National Geographic Society and the American Museum of Natural History is to proceed with most liberal support as an expedition of the Canadian Government.

The Scott tragedy, which has made men's names imperishable and brought the heroic in human nature strongly to all people, has set an emphasis upon expeditions about to enter polar work. Mr. Stefánsson will carry not only a well-equipped expedition into the vastness and bleakness of the North, but also with it the thought and warm heart of the world left in the comforts and comradeship of civilization.

In personality and from training and experience, he is especially fitted for this work, his courage and control of untoward circumstances have been proved in the six years he has already put in on Arctic investigations, and he has shown executive ability and judgment in his plans for organization of the new expedition. I am glad that in addition he has some of the qualities of a dreamer. For the greater work of life requires the man to whom a vision can come with such allurements that he must follow its leading through all obstacles and many years, goaded always to express the irresistible power within him in the accomplishment of that vision. And when I recall that to these characteristics he adds the hardy qualities that come from his ancestry of the North and to these still again the authority of science from his training as an ethnologist, I can but congratulate the scientific world and the Canadian Government that Vilhjálmur Stefánsson has stepped forth to do a man's work in Arctic exploration.

As I said regarding the Crocker Land expedition, I would that my years were fewer that I also might penetrate again into the enchanted solitudes. I can hear the yelping of the dogs, the shouting of the drivers and forward rushing of the sledges, as after days of weary travel across the ragged sea ice, every man and dog spurts for the shore of that untrodden land lying a few yards ahead in the brilliant Arctic sunlight.

<sup>1</sup> See Peary on Crocker Land Expedition in AMERICAN MUSEUM JOURNAL for May, 1912 — EDITOR.



PROPOSED ROUTE OF THE STEFÁNSSON EXPEDITION

Map prepared under Vilhjálmur Stefánsson

Proposed sledge and ship routes and bases of operation of the Stefánsson expedition originally planned under the auspices of the National Geographic Society and American Museum of Natural History and finally transferred to the support of the Canadian Government. The expedition will sail in May from the Canadian naval station at Esquimaux, British Columbia, with the recently purchased "Karluk," 247 tons, for exploration work covering a period of from three to four years

"Your base is one of the nearest, and perhaps the most accessible point for an attack upon the largest remaining unexplored areas within the Arctic Circle."— Quoted from a telegram from Peary to Stefánsson, November 16, 1912



# PLANS OF THE STEFÁNSSON EXPEDITION

By Clark Wissler

A NEW expedition to carry on the work begun in part by the Stefánsson-Anderson expedition was projected some months ago in the interests of the Museum. Immediately on the return of Mr. Stefánsson from his four and a half years in the Arctic, plans were set in preparation in the Museum for this second expedition. The National Geographic Society of Washington initiated the subscription with a large sum for the geographic part of the work. This organization also agreed to coöperate with the Museum in whose behalf Mrs. Morris K. Jesup contributed half the funds required for the expedition. While arrangements were being made for the expedition to set out in May of this year the Canadian Government, which through its Geological Survey was a party to the original Stefánsson-Anderson expedition, made a proposition to take over the entire expedition and to provide a large fund for its support as well as to make it a governmental matter. While this is a great loss to the Museum, it is but fitting that such an important expedition into Canadian territory should be controlled by Canada.

I quote the following letters by the Prime Minister of Canada and the President of the American Museum:

NEW YORK CITY, *February 12, 1913.*

DEAR MR. STEFÁNSSON:

The offer of the Canadian Government, through the telegram of the Honorable William J. Roche, Minister of the Interior, on Monday, February 10, to cover the entire expenses of an expedition to the Arctic, places the plans you have made with us and with the National Geographic Society in a new light.

It would appear that this offers an opportunity of conducting your explorations under the direction of a strong government which, through patriotic as well as scientific motives, will take every possible step to insure success.

We feel bound, under these circumstances, to relinquish the claim which our prolonged preliminary negotiations and understanding may have given us upon your expedition. We desire you to conduct your negotiations, therefore, with the Canadian Government, with entire freedom.

It is, however, with the greatest reluctance that, through our desire to do what seems best for the general interests of science, we sever a connection established in 1908 with yourself and Dr. Anderson, which has been animated throughout by warm personal regard and which has been attended by the achievement of such notable scientific results. We desire especially to make record of our appreciation of the heroic and self-sacrificing efforts which you and Dr. Anderson made in carrying out the project of the first Stefánsson-Anderson expedition.

In case you enter upon this proposed service of the Canadian Government, I am sure that the entire Scientific Staff of the American Museum will unite with me in the expression of our heartiest goodwill and of our desire that you may successfully accomplish all the objects that you have in mind in the way of further exploration.

In view of our past friendly coöperation with the Canadian Survey, we trust that continued coöperation with this Museum, especially in certain lines of anthropology and zoölogy, may be arranged for in connection with your expedition.

Believe me, with the highest regard,

Faithfully yours,

[Signed]

HENRY FAIRFIELD OSBORN

*President of the American Museum of Natural History*

PRIME MINISTER'S OFFICE, CANADA

OTTAWA, ONTARIO, *February 21, 1913*

DEAR SIR:

Mr. Stefánsson has shown me your letter of the 12th instant stating that you are willing to forego your claims to a share in his exploration of the northern waters of Canada, and to cancel the arrangements which you had so generously made to contribute towards the expenses of this undertaking, and I wish to thank you for your courtesy in withdrawing in favor of this Government.

We are most appreciative of the valuable results obtained by Mr. Stefánsson's explorations in the northern part of the American continent, which have given valuable information as to this comparatively unknown portion of the Dominion of Canada, and have to thank you for the part you took in assisting Mr. Stefánsson in that work. The Government of Canada feels however, with regard to the present exploration, that it would be more suitable if the expenses are borne by the Government more immediately interested, and if the expedition sails under the flag of the country which is to be explored. The Government is, however, desirous that the line of investigation begun by Mr. Stefánsson and the members of your Association should be continued and would be glad of the scientific coöperation of your members so as to obtain the best results from this expedition.

Yours very truly,

[Signed] R. L. BORDEN

It is Mr. Stefánsson's present intention to carry out in detail the plan as formerly developed in the interests of this Museum and the National Geographic Society. Its chief aim will be geographical and anthropological exploration. As planned, the expedition will have two main bases, the northern one on Prince Patrick Island and the southern on the mainland of North America near Coronation Gulf. Mr. Stefánsson will give personal attention to geographical exploration and the study of the Eskimo, Dr. Anderson will conduct the biological investigations. It is expected that a staff of at least six scientists will accompany Mr. Stefánsson, Dr. Anderson being one of that number.

In general, the plan is to spend three or four years in an intensive study of the archaeology and ethnology of the Eskimo, together with the zoölogy and geology of the whole region from Alaska to Coronation Gulf. Also, to map the unexplored coast of Victoria and Prince Patrick islands and by off-shore journeys to the north and east determine by means of soundings the extent of the continental shelf and discover new lands, if such there be. It is intended that the expedition shall be a scientific one and devote its energies to the investigation of this unknown region.

The anthropological work is to be made a special feature, the main problem here being to determine the present and former limits of human occupation. During summer the surface will be searched for traces of former villages which when found will be carefully studied by excavation and otherwise to determine their relative ages and the cultural character of their occupants. Such archaeological work is now needed to estimate the period of occupation and the direction of Eskimo migration.

In the east, special attention will be given to the distribution of the peculiar hybrid Eskimo discovered on the last expedition. It is intended that a full census of the people be made, noting the somatic character of each to serve as a basis for the study of this peculiar biological problem.





OUTLINE MAP OF ARCTIC REGIONS

Prepared under direction of R. A. Harris, coastal mathematician of the United States Coast and Geodetic Survey

The map indicates the theoretical position, size (500,000 square miles) and shape of an uncharted Arctic continent, or archipelago of large islands. It shows also the directions and hours of the tides and the rise in feet and tenths — which tidal facts constitute a proof of the existence of the unknown land

# UNDISCOVERED LAND IN THE ARCTIC OCEAN<sup>1</sup>

By R. A. Harris

Of the United States Coast and Geodetic Survey

FROM the behavior of the tides, it can be shown that a deep Arctic basin cannot extend without interruption from the region of deep waters traversed by the "Fram" and embracing the Pole itself, to the known waters lying along the Arctic coasts of British America, Alaska and eastern Siberia. Moreover, this interruption lying between the Arctic Archipelago and the New Siberian Islands must be tolerably complete so far as the greater depths are concerned. For were this not the case, the Arctic basin would be well suited to the production of diurnal or daily tides, which would be much in evidence along the coasts just mentioned. Wherever adequate observations have been made along these coasts, they show that the diurnal tides have less than one-half of the rise and fall which the diurnal tidal forces of the moon and sun acting over the uninterrupted Arctic basin would produce; and again, the diurnal tide actually occurs earlier at Point Barrow than at Flaxman Island while the tidal forces acting over the uninterrupted basin require that the reverse should be the case.

The ratio of the amplitudes of the two principal constituents of the diurnal tide or wave does not have even approximately its theoretical value, a fact which implies for this tide a comparatively complicated origin.<sup>2</sup> It may be noted in passing that it is because the free period of a deep Arctic basin is but a fraction of twenty-four hours in duration that we are enabled to say that approximately equilibrium tides would be the result of the action of the diurnal forces. Moreover these same conditions would reduce the effect of the deflecting force of the earth's rotation to a quantity rather small in comparison with the direct effect of the tide-producing forces, not-

<sup>1</sup> The substance of this article is, in a large measure, included in previous articles by the Author upon the same subject, to which the following are references:

*National Geographic Magazine*, Vol. 15 (1904), pp. 255-261;

*Coast and Geodetic Survey Report*, 1904, pp. 381-389;

*Report of the Eighth International Geographic Congress*, 1904, pp. 397-406;

*The North Pole* by R. E. Peary. New York: Stokes, 1910, pp. 337-346;

*Arctic Tides*; a special publication by the U. S. Coast and Geodetic Survey, 1911, pp. 103. *Arctic Tides* consists of a detailed study of the tides north of the 60th parallel; it includes a cotidal chart of the Arctic regions, upon which is a hypothetical outline of the obstructing mass of land. This is the outline or hypothetical boundary which appears upon the less detailed map accompanying the present article. In the light of more recent observations and discoveries, some of the data used and conclusions reached in the three articles published in 1904 have turned out to be erroneous, as can be seen upon comparison with the later articles. No attempt is here made to go into the history of the question of undiscovered land in the Arctic. References to some of the writings of individuals who prior to 1904 had expressed their views upon this subject are given in the three articles just referred to.

<sup>2</sup> The intensities of the two constituent diurnal forces are, at the Pole,  $0.0000004466 g$  and  $0.0000003175 g$ , respectively,  $g$  being the intensity of the force of gravity. These numerical coefficients multiplied by the distance of a point from the center of gravity of the surface of a deep basin, give the respective amplitudes of the two constituents of the diurnal tide.

withstanding the fact that the effect in question becomes a maximum at the Pole.

At Bennett Island and at Teplitz Bay, Franz Josef Land, the range of the diurnal wave has about one-half of the magnitude which the tidal forces acting over an uninterrupted Arctic basin would produce.

The semidaily tides found in the Arctic Ocean are derived almost entirely from those of the North Atlantic, because the semidaily forces vanish at the Pole and are very small in the higher latitudes. These tides enter the Arctic Ocean proper by way of the strait lying between Spitzbergen and the eastern coast of northern Greenland. They are propagated through the Arctic to the New Siberian Islands, the average rise and fall at Bennett Island being 2.5 feet.<sup>1</sup> Now upon the assumption of an uninterrupted Arctic basin, the tides at Point Barrow and at Flaxman Island could not differ greatly in size from the tides which would, upon the same assumption, be found at Bennett Island. But as a matter of fact the rise and fall of the semidaily tide is 0.4 foot at Point Barrow and 0.5 foot at Flaxman Island. The rise and fall of the semidaily tides at Pitlekaj, a short distance northwest of Bering Strait, is 0.2 foot.

The time of the semidaily tide along the northern coast of Alaska does not agree with the time implied in the transmission of the tide wave from the Greenland Sea through an uninterrupted polar basin having such depths as those discovered by Nansen.

It being thus established that an obstruction in the Arctic Ocean exists which seriously interferes with the production of the diurnal tides in its waters, and moreover causes wide discrepancies between the amount of rise and fall of the semidaily tide at Bennett Island and that found along the northern coast of Alaska, the next questions relate to its size and disposition.

That one corner lies northerly from Bennett Island and is separated from

<sup>1</sup> SUGGESTION CONCERNING TIDAL OBSERVATIONS.—The reading of hourly or half-hourly heights upon a vertical fixed staff, even if for a period no longer than one, two or three days would, in many instances, be of great interest. To judge of the diurnal tide, the time selected should be at or near the time of the moon's farthest north or south. It requires a series of fifteen or thirty days for bringing out the principal tidal constituents. If fluctuations in the daily level are to be ascertained, the longer the series the better.

With the exception of Bennett Island and Pitlekaj, there is at present little or no tidal information available along the Arctic coast of Siberia, or upon the off-lying islands, from Taimir Peninsula to Bering Strait, although the Russian government has recently made tidal observations at Taimir Bay and on one of the New Siberian Islands. Aside from this extended coast line and off-lying islands, where observations would of course be of great value, the localities where information is especially wanted in this connection are: the northwestern coast of Alaska about midway between Point Hope and Point Barrow, Mackenzie Delta (outer coast), Cape Bathurst, west coast of Banks Island, western end of McClure Strait, Prince Patrick Island, Cape Isaachsen, western coast of Axel Heiberg Island, Cape Thomas Hubbard, and northwestern coast of Grant Land.

From *Arctic Tides* already referred to, it can be seen what localities are either wanting or are especially defective in reliable tidal data, and where, if data were secured, a service would be rendered in perfecting our knowledge of the tides. Such points and localities in the Arctic Archipelago are the following: Dolphin and Union Strait, Coronation Gulf, Prince of Wales Strait, Eureka Sound, Nansen Sound, Greely Fiord, McClintock Channel, northern side of Cumberland Peninsula, and the eastern shore of Fox Channel.

this island by a broad and presumably shallow strait can be inferred with considerable certainty from a comparison between the drifting of the "Jeannette," especially the later portion, and that of the "Fram." The "Jeannette" was frozen in at a point lying northeasterly from Wrangel Island and her general subsequent course lay approximately toward Cape Chelyuskin; the "Fram" was frozen in at a point to the northwestward of the New Siberian Islands, and her general subsequent course lay toward the Greenland Sea.

The change in the direction of the drifting ice seems to occur in about the longitude reached by the "Jeannette" when she sank. This indicates that one corner of the unknown land lies not very far to the northward of this point and so probably extends westward to about the meridian  $150^{\circ}$  E. With this strait and land mass assumed, it is easy to see that the semidaily tide transmitted through this strait will be greatly reduced in range upon entering the broad expanse of water to the eastward through a portion of which the "Jeannette" drifted. Hence the small range of the semidaily tides at Pitlekaj, Siberia, and at Point Barrow and other places along the northern and northwestern coast of Alaska. The strait and land mass can also account for the observed fact that the semidaily flood stream at Point Barrow comes from the west and not from the north as the absence of the land mass would imply, especially if the soundings or known depths around Point Barrow be taken into consideration.

An obstruction of the kind already established, probably implies that the land mass extends nearly continuously from the Bennett Island corner to within a short distance of the Arctic Archipelago.

The fact that the tide comes from the west at Point Barrow indicates the existence of a cape or corner of the unknown land lying to the northward of this point. But the fact that the tide is nearly simultaneous all along the northern coast of Alaska implies, not only that Beaufort Sea is a deep body of water, but also that this corner in question lies at a considerable distance from Point Barrow, say five or six degrees of latitude. Such a position of the cape or corner would permit the ice off the northern coast of Alaska to set west-northwest when driven by an easterly or east-northeasterly wind, as was noted on numerous occasions by Mikkelsen and Leffingwell in April and May, 1907, in longitudes varying from  $148^{\circ}$  to  $151^{\circ}$  W.

That there is a northern coast to Beaufort Sea in some such position as that shown in the diagram and extending from north of Point Barrow nearly to Banks Island, can be inferred from the following considerations:

1. The ice in Beaufort Sea does not drift freely to the northward, and is remarkable for its thickness and age. Northeasterly winds drive the ice westward. West of Banks Island large and old ice floes probably always extend down to the  $72^{\circ}$  parallel.

2. The observations just referred to indicate not only a considerable

westerly drifting when the wind is from an easterly direction, but also little or no movement of the ice when the wind is westerly. These circumstances, as far as they go, tend to show that Beaufort Sea is nearly landlocked in all directions excepting toward the west.

3. A description of the tide in Elson's Bay just east of Point Barrow, found upon p. 162, Vol. 42 (1854), of *Accounts and Papers, Navy*, reads as follows:

"The tides have been registered hourly for nine months, and the result is that the flood makes from the west, and the mean rise and fall in Elson's Bay is seven inches. The time of high water at full and change is 1 P. M., but great irregularities occur from the wind, the rise being scarcely perceptible with fresh east and northeast breezes, when with southwest gales it amounts to  $3\frac{1}{2}$  feet. Of the latter case, a remarkable instance occurred on the 18th of December, when the water rose from the usual depth of  $14\frac{1}{2}$  feet to 17 feet 10 inches, with a gale at southwest (true), the force of which was registered for fourteen hours at 8 feet, 9 inches and 10 feet."

Observations made at Ooglaamie just west of Point Barrow from February 26 to June 17, 1883, show that a west-southwest wind may, in extreme cases, cause the daily sea level to stand nearly three feet higher than when the wind is from the east-northeast. Observations taken on the south side of Flaxman Island in 1906, show that during the period extending from October 21 to December 17 the fluctuation in the daily sea level amounted to two feet, the lowest stage occurring at the time of northeasterly winds and the highest stage on westerly or southwesterly winds. Messrs. Leffingwell and Stefánsson have informed me that effects similar to these are common all along the northern coast of Alaska.

The natural inference from this is that the unknown coast line in question is not very remote from the northern coast line of Alaska and that the unknown land approaches the known Arctic Archipelago in one or more points, thus making a fairly complete land boundary to the north of Beaufort Sea.

4. There are large quantities of driftwood to the westward of the mouth of the Mackenzie River and a considerable amount for some distance to the eastward, although very little as far east as Coronation Gulf. This indicates a general westward movement of the ice in Beaufort Sea with occasional eastward movements when strong westerly winds prevail. Very little driftwood has been found on the islands to the northeastward of Banks Island or along the northern coasts of Grant Land and Greenland. This indicates that no drift ice of consequence goes from Beaufort Sea to the open ocean via the passage lying north of Prince Patrick Island, Axel Heiberg Island, Grant Land, and Greenland, and so the probability of a narrowing of the passage at one or more points. Were it not for prevailing easterly winds, the waters of the Mackenzie River should, because of the deflecting force of the earth's rotation, bear off to the eastward, instead of taking a more or less westerly direction.



5. It may be well here to call attention to the dividing line between the east-going and west-going drifts. Amongst the islands constituting the Arctic Archipelago, the general drift is easterly or southeasterly and here northwesterly winds prevail. Off the northern coast of Alaska the drift is westerly or somewhat to the north of west and the prevailing wind is from the east-northeast. It is probable, for reasons already given, that the prevailing drift on the Beaufort Sea proper is westerly. The eastern boundary of this sea appears to lie upon or near the dividing line between the east-going and west-going drifts. The proximity of one corner of the unknown land to either Banks Island or Prince Patrick Island would seem to harmonize with the approximate location of the divide.

Some of the facts which indicate the existence of a corner of the unknown land to the northwest of Grant Land are the following:

1. The sighting of Crocker Land by Peary, June 24, 1906, from an altitude of about two thousand feet.

2. The eastward progression of the semidaily tide along the northern coast of Grant Land, indicating that the tide derived from Lancaster and Jones Sounds, which progresses northerly through the channels to the westward of Axel Heiberg Island does not become exceedingly small when the northern coast of Grant Land is reached, as would probably be the case did not the unknown land approach Grant Land and so form the northern boundary of a channel of moderate width.

3. On his northward journey to the Pole, Peary found fox tracks a little below the 87th parallel and bear tracks just below latitude  $86\frac{1}{2}^{\circ}$ . On his return march he found fox tracks somewhat north of the 87th parallel and bear tracks at latitude about  $85\frac{1}{2}^{\circ}$ .

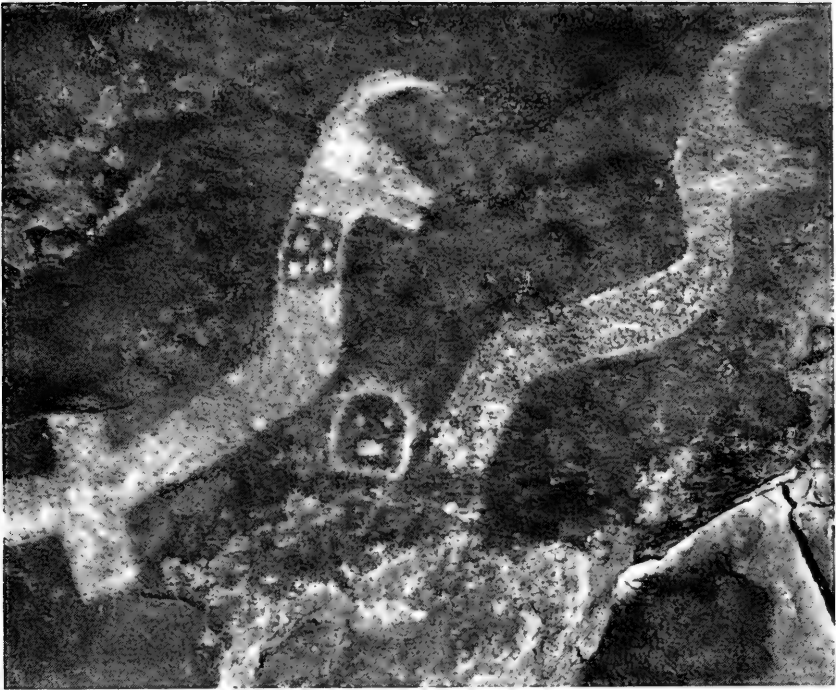
4. On the northward march of the Peary expedition, Marvin obtained in latitude  $85^{\circ} 23'$  a sounding of 310 fathoms — a depth much less than was found at the two preceding sounding stations.

Assuming for reasons already given, the existence of a corner or cape lying northward from Bennett Island and similarly, of a corner lying northwestward from Grant Land, it is natural to suppose that a poleward, or European, side of this unknown land exists which connects in some fairly continuous manner the two corners just mentioned. The unexpectedly large range of tide at Bennett Island is a reason for drawing this boundary as near the Pole as known facts seem to permit; for in this way the tidal area between the unknown land and Europe is kept down as much as possible, thus helping to explain this unexpectedly large range of tide. It may be noted that the diurnal tidal forces acting upon the deep basin lying between this assumed boundary of the unknown land and Spitzbergen and Franz Josef Archipelago, give from theory a range and time of diurnal tide at Teplitz Bay very nearly equal to the range and time found from actual observation at that place.



**PETROGLYPH OF A HORNED SERPENT**

The original length of this rock picture of the horned serpent was not less than twenty-five feet. Snakes are still held in high regard by some of the Southwest Indians and in Hopi villages play an important part in the rain-producing ceremonies



Petroglyphs, or pictures chiseled on rock, representing mythical horned serpents, near Pueblo San Cristóbal

## RUINS OF PREHISTORIC NEW MEXICO

EXTENSIVE EXCAVATIONS OF PUEBLOS IN THE RIO GRANDE VALLEY

By N. C. Nelson

**A**FTER the lapse of a decade the American Museum has once more begun archæological research in the Southwest. It is felt that many problems relating to the origin and distribution of peoples and to cultural traits now observable in the Southwest cannot be solved in their entirety by the examination of present-day conditions or even by consulting Spanish documentary history, which though it takes us back nearly four hundred years and is reasonably accurate, shows us little more than the last phase of development within this most interesting ethnographic division of the United States. By a tolerably exhaustive study of the thousands of ruins and other archæological features characteristic of the region, we may hope in time to gain not only an idea of prehistoric conditions but perhaps also an adequate explanation of the origin, the antiquity and the course of development leading up to a better understanding of the present status of aboriginal life in the region.

The field is very large and the work to be done so well-nigh momentous that no one institution will presume to accomplish it. Up to thirty years

ago hardly anything was known about the archæological wealth of the region; and while since then many surveys and excavations have been made, there are still localities in which exist many ruins more or less well known, which have never been seen by any archæologist. One such locality is the Rio Grande drainage in the state of New Mexico or that part of the drainage ranging from the Jemez Mountains south to the Mexican boundary. It was to this area that the Museum's Southwest expedition gave its attention for six months of 1912.<sup>1</sup>

The field work began at Ysleta del Sur, a few miles below El Paso, Texas, and the advance was made up the valley chiefly by short railroad journeys. From most of the numerous stops, side trips east and west were taken on horseback or by wagon as conditions favored. Lack of time and the extremely swollen condition of the river impeded the work. Nevertheless at the end of five weeks when the Cochiti Cañon in the latitude of Santa Fé was reached, the location of one hundred and fifteen archæological sites had been ascertained, these comprising caves, rock-shelters, camp sites, mescal pits, cemeteries and petroglyphs as well as extensive ruins.

The region under consideration is eminently suited to have furthered the advance of a primitive culture in prehistoric times. The Rio Grande from the mouth of Santa Fé Creek where it emerges on its first considerable flood plain, takes a moderately sinuous course almost due south to El Paso. Throughout this three-hundred-mile stretch, the river receives numerous, mostly minor, tributaries, especially from the generally higher and more broken country which tends to crowd it along the west side. On the east there are only two or three affluents, all well to the north, the most important being Galisteo Creek. The dearth of tributary streams here is due to the fact that the mountain ranges paralleling the river are either very close to the stream as in the case of the Caballos and Sandia ranges, or are sepa-



Beginning to clear the ruins of a two-story house of prehistoric date at Pueblo San Cristóbal

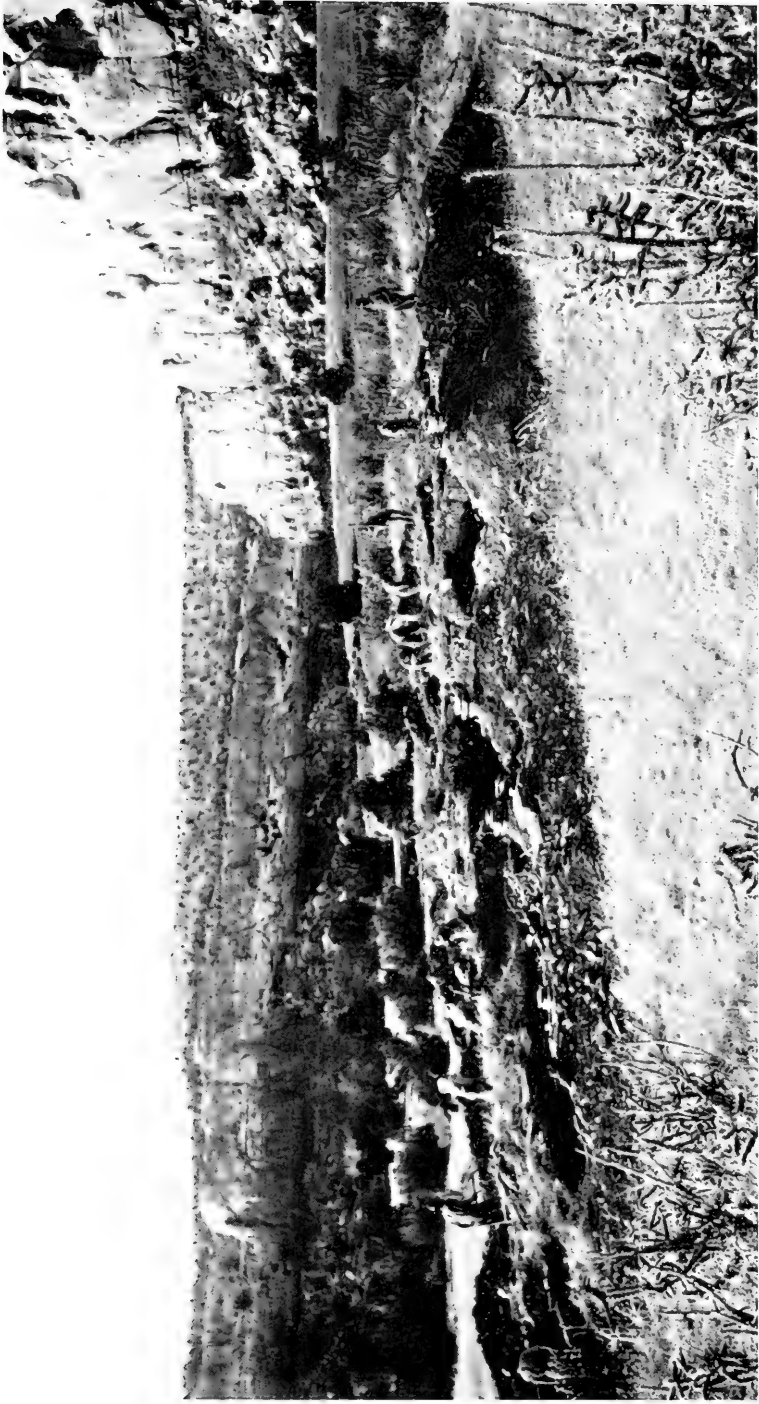
<sup>1</sup> Previous to the work in the Rio Grande valley, the expedition made brief visits to the well-known Casa Grande ruins near Phoenix, Arizona, and to Bisbee close to the Mexican boundary, where through the kindness of Mr. Cleveland H. Dodge, one of the trustees of the American Museum, some interesting petroglyphs were examined





#### PUEBLO COLORADO RUINS

The cacti-covered mounds and ridges as seen from a nearby high cliff show the general arrangement of the village buildings, collapsed more than 350 years ago. In the large courtyard to the left is a circular reservoir which received its supply from the frequent thunder-showers peculiar to the region through a small dry gully beyond the view to the left



#### EXCAVATING A BUILDING AT PUEBLO COLORADO

This house, one of the smaller buildings of the pueblo, contained twenty-eight ground floor rooms in many of which were fireplaces and bins, pottery vessels, stones for grinding maize, and other objects of prehistoric culture. The maize-grinders may be observed piled up on the debris

rated from it by broad stretches of low semi-desert or barren plains, across which no living stream can reach.

The river valley itself, or more properly its productive flood plain, varies in width from almost nothing up to four and five miles, according as the mountain ranges and occasional lava flows approach one another from opposite sides of the stream. This flood plain, subject in part to inundations, comprises close to 400,000 acres and is all of it suitable for irrigation. It was doubtless this fact which made the Rio Grande valley relatively populous in prehistoric times. Our first definite knowledge of its inhabitants



Ceiling and roof construction at Pueblo San Cristóbal. Over the timbers was placed a thicker layer of adobe sufficient to shed the rains



Small bin for foodstuffs, built of stone slabs in the corner of a room, at Pueblo San Cristóbal

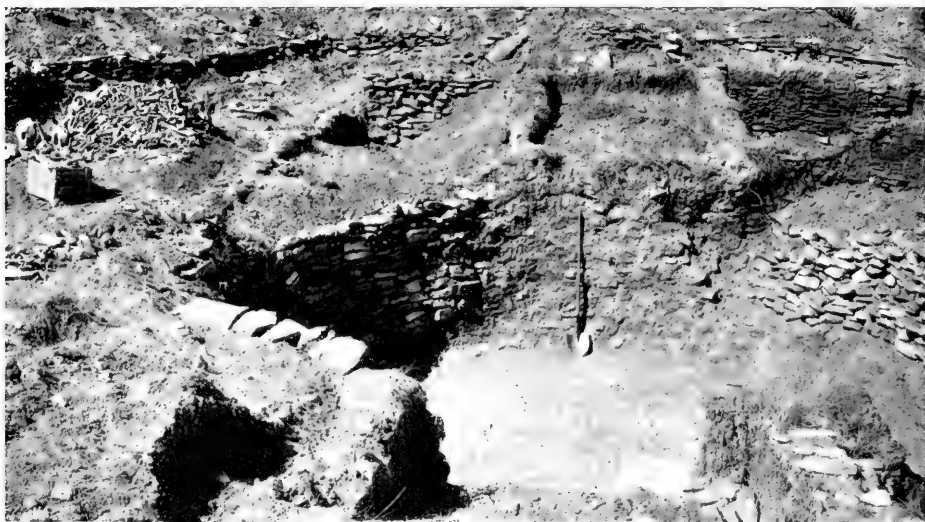
dates back to the year 1540 when the Coronado expedition reported the existence of about seventy pueblos or villages in the valley. At the present day only seventeen villages of the old type remain in the entire Rio Grande drainage, and several of these such as Santo Domingo as well as additional scattered settlements near Las Cruces and at Ysleta del Sur, are of modern origin. From these facts it will readily be seen how rich the region must be in archaeological data.

Most of the ruins located by the expedition however are not situated on the great river or the lands described as most suitable for cultivation but to the east and the west thirty or forty miles away. It is conceded that the Museum expedition did not examine all the ruins known to exist close to the Rio Grande; but if that had





Pottery found at Pueblo San Cristóbal. The ware is mostly of prehistoric make and includes bowls and small jars, some having painted and some glazed decoration



Circular kiva excavated at Pueblo San Cristóbal. This ceremonial chamber, twenty feet in diameter, was built into one of the regular long houses. The stones in the floor were possibly rests for ceiling props



Pottery vessels found at Pueblo San Cristóbal. The specimens are from a building inhabited during historic times and differ somewhat from the ancient ware in the nature of the glazed ornamentation



**RUIN OF PREHISTORIC BUILDING OF SEVENTY-TWO ROOMS**

The portions of the walls remaining in this ruin rise only from two to five feet above their foundation which corresponds to the general ground level. In process of excavation. Church ruin on the extreme left



Men at work clearing the rooms surrounding a kiva in a historic building at Pueblo San Cristóbal.

been done, the number would still have fallen far short of seventy, the total given by Coronado as inhabited in 1540. Doubtless Coronado's list included some of the villages located on the tributary streams such as Galisteo Creek, but there is still a margin to be accounted for and one is forced to believe that during the intervening centuries many village sites have been washed away or by some process obliterated. Such obliteration may explain also the apparent absence of village ruins at the southern end, that is, in the great Mesilla section of the valley, although we have here no less than 180,000 acres of bottom land suitable for cultivation.

As for the presence of immense ruins distant from the rich bottom lands, the fact is not easily explained. It may be stated however that, contrary to the prevailing notion about the great heat and dryness of New Mexican climate, dry farming is possible in the region say from Gran Quivira northward. Besides it is conceivable that these distant villagers did cultivate lands on the river bottom.



Human skeleton, apparently that of a woman who had been left lying in the corner of the room in the position in which she died

Up to the present time very little excavation had been done in the mapped area although immediately to the north in the more rugged and picturesque Pajarito Park district, important work has been carried on for some years by the School of American Archaeology located at Santa Fé. It was partly with a view to profit by the presence of comparative culture material from an adjacent locality that the Museum excavations were begun at the northern extremity of the region under consideration. Here the ruins



Petroglyphs near Pueblo San Cristóbal. Deer, snakes and other animals are represented

are also more thickly scattered than farther to the south, and climatic as well as other material conditions made it altogether the most suitable region in which to make a beginning.

The specific locality chosen was a large barren depression about twenty-five miles south of Santa Fé and the gathering place for the several streams which make up Galisteo Creek, an affluent of the Rio Grande some thirty

miles to the northwest. The excavated ruins, such as Tanos and San Cristóbal, are situated on these tributary streams and are arranged in such a way as to enclose a roughly oval stretch of territory about eight or ten miles in diameter — the Galisteo Basin. The ruins normally do not lie in the open basin, but immediately beyond its borders, a short distance up the cañons, penetrating the surrounding mesas and low-timbered hills. Various common sense reasons for the choice of site are usually apparent, such as shelter, the presence of building material, timber and water. Doubtless the element of defence against marauding enemies played a part although it is not clearly apparent in some cases.<sup>1</sup>

The Galisteo pueblos resemble those observed elsewhere in the Rio Grande drainage. They represent villages of the well-known communistic type, consisting of a series of buildings arranged at right angles in such a way as to form one or more enclosed courts or plazas. Within these enclosures are usually found traces of a circular and semi-subterranean structure, known as a kiva or estufa, and in fact a sort of underground house used in

part for ceremonial purposes to the present day by the remaining Pueblo Indians along the Rio Grande. The ruins are those of large towns covering an area from three to ten acres in extent and appearing to-day in the form of well-marked ridges representing collapsed two and three story houses, invariably covered with a heavy growth of cacti. Close to the ruins are usually found one or more refuse heaps made up of ashes, animal bones, lost and discarded as well as broken artifacts, and a large number of human burials. The sites are characterized moreover



Remains of Spanish mission church at Pueblo San Cristóbal. Built probably during the first half of the seventeenth century and abandoned in 1680

<sup>1</sup> It should be stated also that four of the excavated pueblos are located on the large estate of Mr. B. F. Pankey of Santa Fé, to whose generous treatment the expedition owes much.

by the presence of large artificial reservoirs sometimes at a considerable distance from the pueblo and sometimes, as is shown in one of the illustrations, directly within one of the courtyards of the village.

Still another feature of interest connected with each one of the pueblos is the presence of numerous petroglyphs or pictures chiseled on the nearby rocks. Some of the figures are purely geometric, others are conventionalized representations having no doubt a symbolic meaning and still others are unusually excellent delineations of the plant and animal life of the region. In a few instances scenes from the life of the people such as hunting and other pursuits have been depicted.

The excavation of the Galisteo pueblos occupied fully three months. Ten to fifteen laborers were constantly employed. No one of the ruined villages was completely bared, but enough excavation was done at each place to obtain a clear idea of the relative antiquity of the sites and their cultural relationships. Besides opening numerous scattered rooms, three entire buildings were cleared, the largest one, containing seventy-two rooms, being at San Cristóbal. Four of the seven ruins were found to be of prehistoric date, that is, they contained no evidence whatever of contact with European civilization.

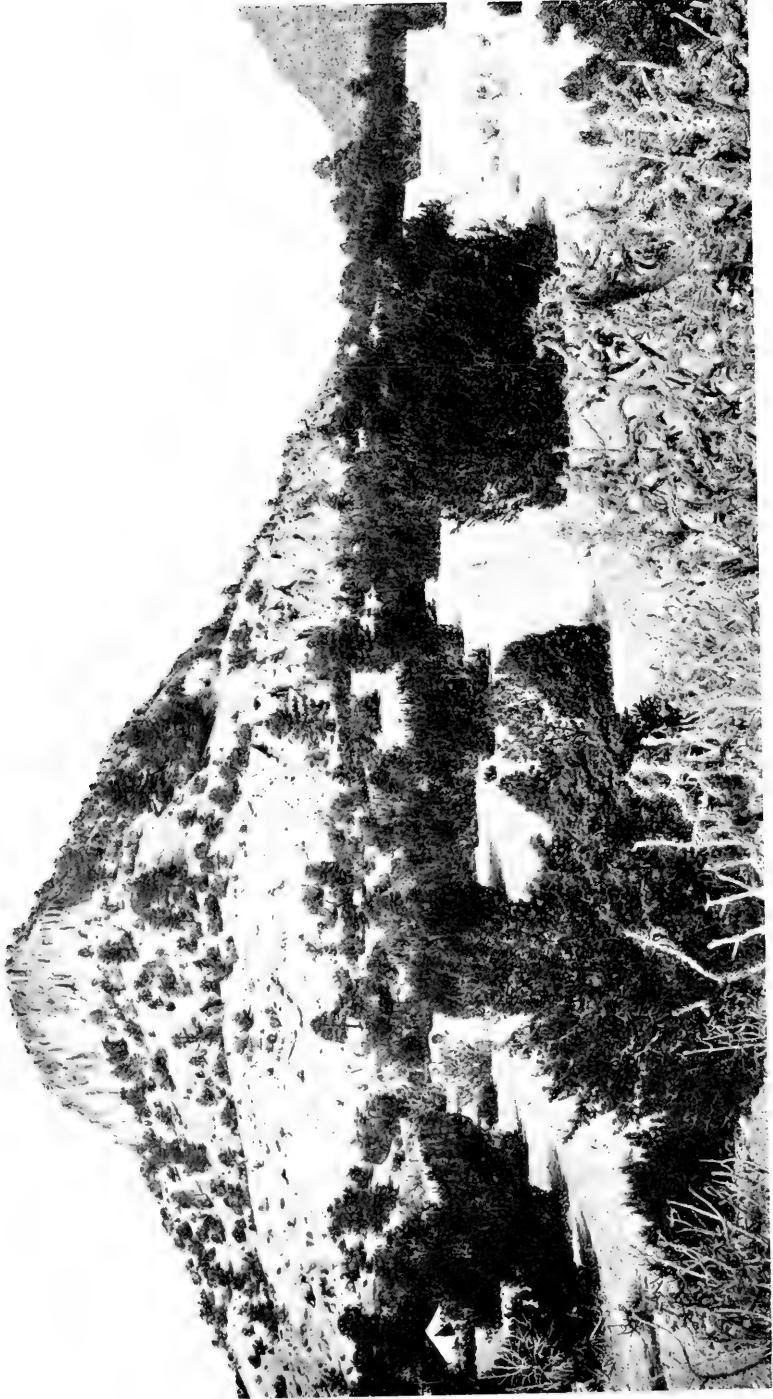
The buildings range from about fifty to seven hundred feet in length and from thirty to forty-five feet in width. The walls, built usually of sandstone slabs and in a few instances of adobe blocks laid in mortar, still stand to a height of from two to nine feet, although as previously stated, they no doubt rose to a height of two and three stories, that is, about twenty feet. In some buildings the two or more stories rose on the terraced plan observable in several of the modern pueblos. The walls were plastered with mud and sometimes whitewashed. The floors were flagged with stone or were made of tamped clay, possibly mixed with blood, and showing often a very smooth and semi-polished surface. The ceiling, barely five and one-half feet above the floor level, was supported by heavy crossbeams overlaid by light timbers, brushwood and grass, on which was placed a layer of tamped clay to serve as floor for the story above. The rooms, usually rectangular or nearly so, averaged about seven by twelve feet in size, the larger dimension corresponding always to the long axis of the building, so that all the buildings of normal dimensions were from four to six rooms wide. From this fact it will readily be seen that whenever a building was of more than one story height, it contained a large number of interior and therefore dark rooms. These latter compartments were entered from the lighted exterior rooms by means of small rectangular doorways in the partition wall, usually a foot or two above the floor. The outer rooms themselves were presumably entered through an opening in the ceiling, as no doors were found in the walls leading directly to the courtyard. The arrangement of the different parts of the pueblo, as well as the regularity observed in the archi-



Rock-shelter at Pueblo San Cristóbal, formerly occupied by Indians (during a part of the field season by members of the expedition). The barren stretch between the cave and the timber line is a mass of ruins partly washed away and overgrown with grass



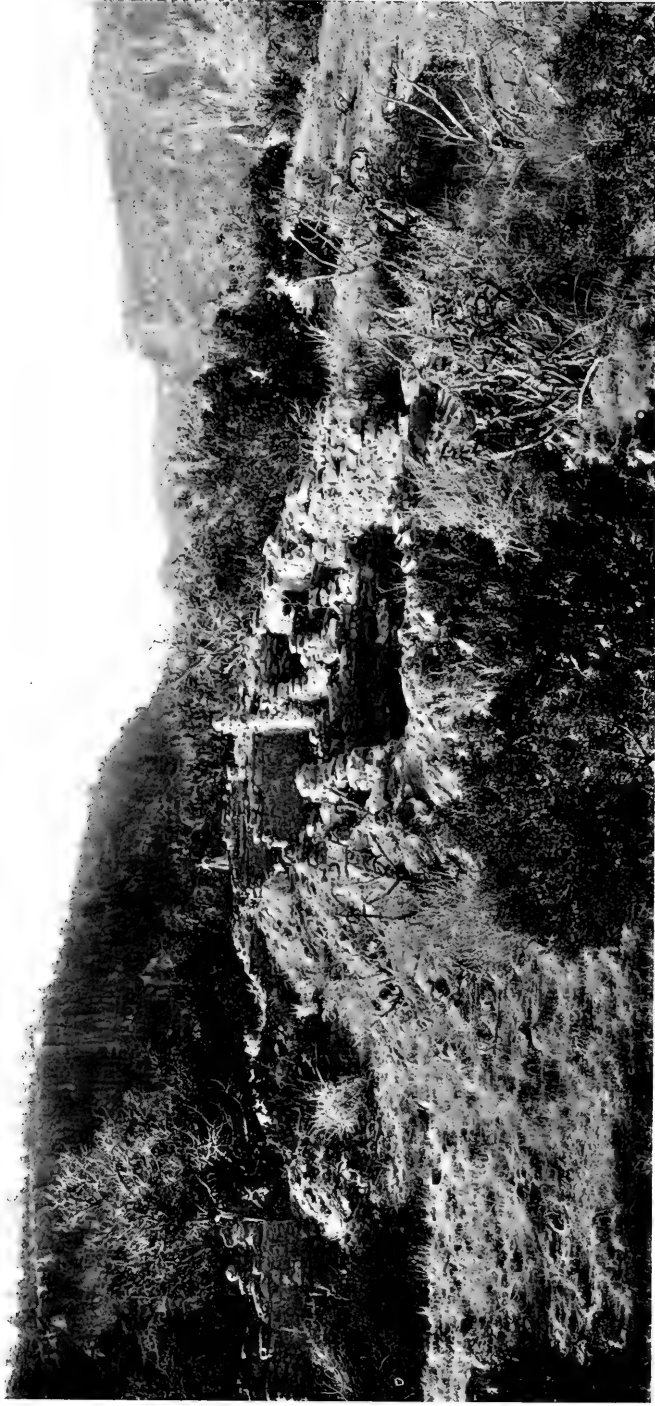
Best preserved portion of Pueblo Kotyiti which has stood in ruins for 220 years. Note the plaster still adhering to the walls



POTRERO VIEJO, AS SEEN FROM THE FRONT

On top of this natural fortress, a steep-sided mesa spur 500 feet high, the Indians of the region built a refuge village and made one of their last stands against the Spaniards





ONE OF THE RUINED BUILDINGS ON POTRERO VIEJO

This building of Pueblo Koyiti was burned down by the Spaniards in 1693. About one hundred feet to the right of the building yawns the deep Cochiti Cañon at the bottom of which flows a small permanent stream, the only source of water supply for the mesa dwellers. After excavation of ruin



Fireplace at Pueblo Kotyiti. Across the upright stones was placed a smooth stone slab on which the cooking was done

texture of individual buildings, suggests that the building plan was thought out before the construction work began.

Within the rooms were found such stationary household effects built of stone slabs, as fireplaces and bins for food stuffs. Also cages containing the bony remains of turkeys and eagles were found. Scattered on the floor and

throughout the débris from the collapsed upper stories were numerous implements and utensils of bone, stone and shell, as well as pottery. Most of the specimens were used in the preparation of food and clothing, but things were present also suggestive of the less material side of life as for example, tobacco pipes, flutes, whistles, and ornamental objects of shell and turquoise. Smooth pebbles, quartz crystals, oddly shaped and curious rock formations, and even fossils were commonly met with and serve as testimony of ancient animistic beliefs. In one room was uncovered a small altar in the shape of a low platform. On it stood a human-like image of stone and



Human burial in refuse heap on which was later built a two or three story house. The body was tightly doubled up and laid face down

around this supposed god were laid numerous objects of the various types mentioned above.

The inhabitants of these villages or large groups of apartment houses, as they might be called, were agriculturists rather than hunters. Bones of



A shrine found in one of the rooms at Pueblo Largo. On a low earthen platform and leaning against the wall stands a stone image surrounded by various objects of bone, stone, and pottery. Photographed very nearly as found

the deer, the buffalo, and other animals were occasionally found in the prehistoric ruins; but it seems very clear that the meat diet was relatively light until the Spanish conquerors brought the domesticated animals of Europe. Remains of charred maize were found however, in every one of



#### RUIN OF A LONG HOUSE AT PUEBLO LARGO

This structure was originally built at a safe distance from the deep arroyo or gully passing through the village. After the site was abandoned and the neglected dams retaining the flow of water in the gully some distance above the village were broken through, the stream began to undercut its bank and at last reached the ruined building which is now more than half carried away

the ruins, so that although the cultivated fields can no longer be discerned, we may be reasonably certain that the inhabitants subsisted mainly by the cultivation of the soil.

Incidental to the expedition's main work in the Galisteo region, two weeks were given to the excavation of the historically famous ruin of Kotyiti on Potrero Viejo, a few miles west of the Rio Grande in the latitude of Santa Fé. Potrero Viejo is a high, steep-sided mesa spur, a strong natural fortress. It shows signs of having been occupied once in very ancient times, but Kotyiti itself was a village or temporary refuge built shortly after the Indian rebellion of 1680 to be destroyed by the reconquering Spaniards in 1693. Its excavation was undertaken partly to verify Spanish documentary history and partly also because it was possible to get here a glimpse of the conditions

of pueblo life at a given and known instant of time. The entire ruin was cleared. It contained one hundred and thirty-six rather large living rooms and two estufas. The chief thing of interest learned from the excavation here was the fact that the Indians in the absence of the Spaniards made a fair success of smelting copper ore. This art was of course not of native origin but had been acquired in connection with Spanish mining operations.



Doorway connecting interior rooms at Pueblo San Cristóbal. This is the form of door in general use in all the pueblos of the region



Illustration of the masonry at Pueblo Kotyiti. The larger blocks of stone were roughly dressed with stone tools and laid in mortar, after which the wall was chinked with small angular fragments, plastered and often white-washed



FIGURE FROM THE NEW NAVAJO GROUP

Engaged in smoking a cigarette while he watches the women work. [The pipes of the Navajo tribe are used in ceremonies only.] This figure illustrates the manner of wearing the blankets made by the Navajo and shows the fringed buckskin leggings common until fifty years ago

## INDIANS OF THE SOUTHWEST

SPECIAL EXHIBITION OPENED FEBRUARY 27 AT THE MUSEUM  
NAVAJO BLANKETS, PUEBLO POTTERY, PAINTINGS BY DIS-  
TINGUISHED ARTISTS, TO ILLUSTRATE THE LIFE OF  
INDIANS IN NEW MEXICO AND ARIZONA

FOR several years the Museum has been engaged in the study of the Indians of the Southwest in the course of which larger collections were made than can be exhibited at one time. The field work was provided for by Mr. Archer M. Huntington. In addition to the collections made under this grant, are shown the J. Pierpont Morgan Navajo textile collection and the Anson W. Hard collection of Mexican serapes. The permanent exhibit of material from the former Hyde expeditions is also on view. This exhibition will make it possible for those interested in the anthropology of the Southwest to study intensively the many characteristic phases of culture peculiar thereto.



Pounding one of the Mexican silver dollars from which Navajo jewelry is made. The silver-beater has on a velvet blouse and white cotton trousers, a costume much worn by Navajo men. The silver is shaped by pounding, then ornamented by stamping with steel dies. Finger rings, bracelets, necklaces and large oval disks for belts are the objects more commonly made for Navajo use

The Navajo girl is carrying in her shawl the baby brother too large for the cradle-board

There will also be on view a number of paintings by distinguished artists including some work by the late Louis Akin. This with photographs, sketches and maps will give one the feeling of the Southwest.

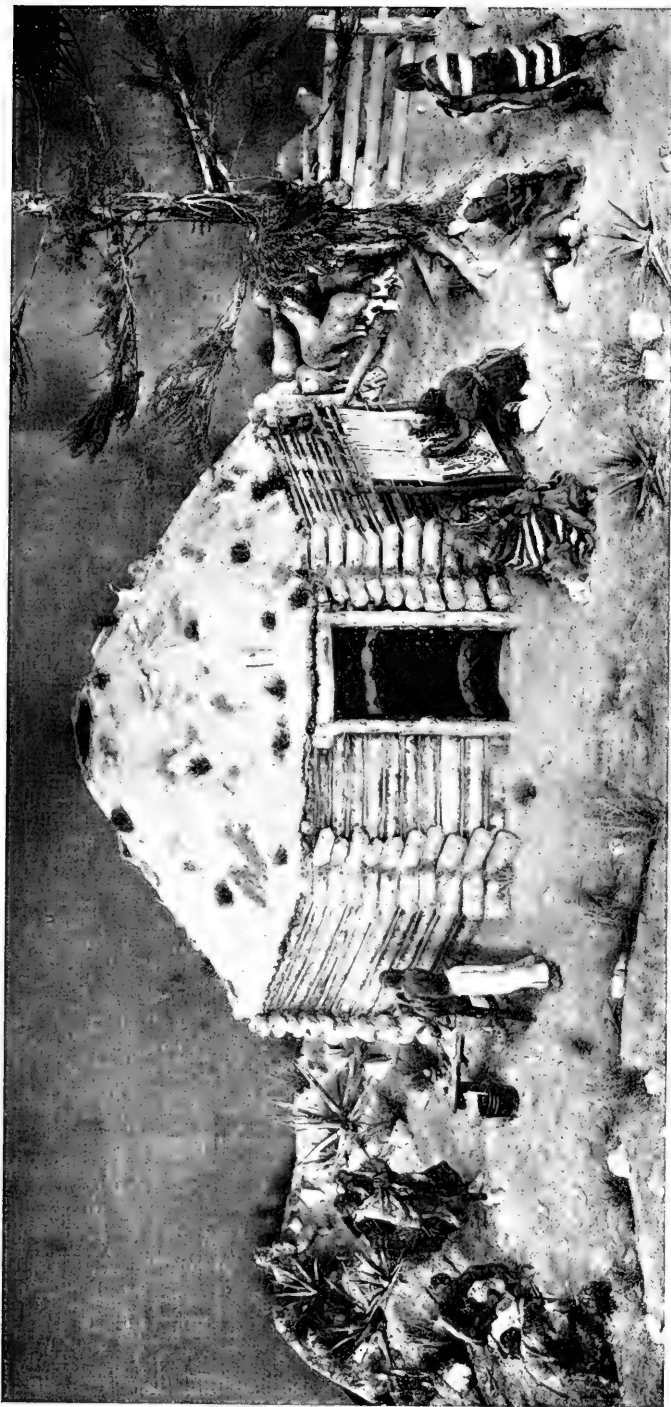
One of the special ethnic groups is here shown in the illustrations. Supplementary to this is a full-sized hogan or Navajo house, shipped to the Museum from the Navajo reservation. This is one of the older types of ceremonial hogan, built upon a foundation of four forked logs, the arrangement of which suggests the tipi pole structure among the Crow and some other tribes of Northern Plains Indians. In the near future it is proposed that the interior of this hogan be fitted out with the furnishings of a Navajo home and life-sized figures of the occupants.

A handbook on the Southwest has just been written by Dr. P. E. Goddard in which are discussed phases of Indian life peculiar to that part of our country. For a long time the Navajo and Pueblo Indians have excelled in decorated pottery and textiles. These arts are rather old because in many ancient ruins are fragments of very fine pottery. Also the early Spanish explorers found the people spinning and weaving cotton.



Navajo man making turquoise beads (drilling a piece of turquoise matrix with a bow drill)





#### A GROUP SHOWING NAVAJO HOME LIFE AND INDUSTRIES

Figures modeled by Misa, Nessa Cohen, colored by Frederick H. Stoll. Accessories made and group assembled by Otto Block

The Navajo Indians of the Southwest have remade themselves since the Spaniards came into that country in 1540. They were a nomadic hunting people; they became a pastoral people. Nearly every family has a flock of sheep tended by the women and children. The increase of the flocks furnishes meat for home consumption. The wool is either sold through the trader or is made into blankets. Three parts of the process of blanket-making are illustrated on the right side of the Museum Navajo group. One woman is carding the wool into rolls, another is spinning the yarn, and a third is weaving a blanket on a simple loom. On the left of the group are men engaged in making ornaments of silver and turquoise and a boy is at the forge with bellows melting silver for casting.



A DETAIL OF THE WHARF-PILE GROUP

The broken pile at the right is crowded with edible mussels, upon which are growing the feathery colonies of a beautiful pink-centered tubularian hydroid. The irregular lobed mass of the rose-colored ascidian ("sea pork") is seen on the upper part of the pile. On the pile at the left are shown sea anemones and various ascidians as well as colonies of the red-beard sponge

# ANIMALS OF THE WHARF PILES

THE NEW VINEYARD HAVEN GROUP<sup>1</sup> AS AN ILLUSTRATION OF  
CERTAIN PHASES OF EVOLUTION

By Roy W. Miner

THE animal life which grows on the wharf piles furnishes a striking illustration of one of the important adaptive phases of the process of evolution — namely, specialization to an inactive life. In the new Vineyard Haven wharf-pile group, recently completed for one of the windows of the Darwin hall, an attempt has been made to emphasize this principle, as well as to depict the abundance and beauty of the animals themselves in their natural environment. The group illustrates a balanced association in which the struggle for existence between animals is not apparent, the majority of the species being plantlike and either incapable of locomotion in the adult stage, or in possession of it to a very limited degree.

On the broken pile in the center of the foreground, for example, growing over the mussels which have completely covered its stump are hundreds of delicate pink hydroids (*Tubularia crocea*) clustered in feathery colonies. Here and there among them peep forth the transparent solitary polyps of the white-armed sea anemone (*Sagartia leucolena*), while the larger brown sea-anemone (*Metridium marginatum*) expands its fringe-crowned disks on this and the neighboring piles, interspersed with coral red masses of the red-beard sponge (*Microciona prolifera*). Although these flower-like forms are relatively stationary and inactive, underneath their apparent peacefulness and beauty the struggle for existence goes on as relentlessly as among fierce free-swimming species, but with this difference, that their prey is invisible to our eyes. The waters in which they are immersed are swarming with myriads of microscopic creatures, while every polyp, with open rapacious mouth and extended stinging tentacles is but a trap to entangle and engulf them, and every sponge-colony with its million pores sucks in the nutritious draft of organisms which are the ultimate basis of food for all sea-life. In a word, sponges and polyps in spite of their size and wide diversity of form are but little above the simplest of all animals, the one-celled protozoa, and have developed as typically digestive organisms. Since their food is everywhere present, organs of locomotion are not needed to obtain it. Special senses and directive intelligence or instincts have not been definitely evolved, since the evolution of these powers always goes hand in hand with that of locomotor organs. It is true that certain polyps possess somewhat aimless and imperfect methods of locomotion such as the

<sup>1</sup> The field work, composition and effects for this group are the work of the author. The modeling and preparation was done by Mr. I. Matausch assisted by Mr. E. Müller, the glass-work by Mr. H. Müller, and the coloring by Messrs. S. Shimotori and I. Matausch, under the supervision of the author. Through the courtesy of the United States Fish Commission the laboratories and equipment of its Woods Hole station were put at the disposal of the Museum for the field work of this group

slow creeping movement of the sea anemones and the umbrella mode of propulsion peculiar to hydromedusæ and the true jellyfishes — a beautiful example of which (*Dactylometra quinquecirra*) is shown lazily swimming near the broken pile in the group. But the polyps as a whole may be considered as mere saclike stomachs, this specialization in digestion being their most striking advance, aside from their multicellular structure, over their protozoan progenitors. Yet there is good reason to believe that a polyp-like condition such as this is ancestral to the structure of all the higher and more complex groups of the Animal Kingdom.

Associated with the sponges and polyps upon the wharf piles are many other sedentary animals which like them feed upon the microorganisms of the sea. At first glance these seem to be of hardly higher organization than the polyps, but an examination of their structure at once shows them



The squid (*Loligo pealii*), a carnivorous free swimming mollusk, propels itself by ejecting a stream of water. It has highly specialized eyes and a beak-like mouth surrounded by sucker-bearing tentacles

to be members of much higher groups in the scale of life. Examples of these are the edible bivalve mussels (*Mytilus edulis*) clustered thickly upon the piles. These animals are so closely adapted to an attached mode of life and a diet of microorganisms that the average observer, unacquainted with their affinities, would fail to recognize them as being in-

cluded in the same great phylum (Mollusca) as the active and highly specialized squid, an example of which (*Loligo pealii*) is shown in the group swimming near the same pile. Again, closely encrusting the pile to the left are masses of coiled calcareous tubes, the homes of the tube-building worm (*Hydroides dianthus*) whose multicolored gill circlets are everywhere peeping forth from the tube-openings, giving their owners, to the superficial glance, a much closer resemblance to hydroids and small sea anemones than to highly specialized members of the annulate worm group to which they really belong.

Finally, everywhere on the piles are various species of sea squirts or ascidians, singly and in colonies. These small saclike creatures each with

a projecting pair of tubes or "siphons," though apparently insignificant, are in reality highly interesting from an evolutionary standpoint. One species (*Molgula manhattanensis*) is represented as growing in large yellow masses on the upper part of one of the piles. Some of the individuals of this species are marked with dark starlike colonies of another ascidian (*Botryllus gouldii*), which grow upon their surfaces. Here and there stand out the conspicuous masses of the pink "sea-pork" (*Amaroucium pellucidum*) a colonial ascidian whose minute individuals are perceptible as white dots forming irregular ringlike patterns on the colonial mass. On one pile a spreading white patch marks the position of a colony of the species *Leptoclinium albidum*, and here and there bits of delicate web-like net-work dotted with tiny green globules grow over mussels and sea-weed indicating the presence of the green ascidian (*Perophora viridis*). Some of the ascidians are more or less solitary like the brownish *Cynthia partita*, and still others (*Ciona tenella*) grow in clumps of several individuals, comparatively large in size. These have translucent yellowish bodies through which may be seen glimpses of the internal organs. The ascidians as a group possess a peculiar interest for biologists, since in spite of their humble appearance and



A typical ascidian, or sea-squirt (*Ciona tenella*). A food-bearing stream of sea-water enters and leaves the creature's sac-like translucent body by means of the two tubes or siphons



Large yellow masses of the sea-squirt *Molgula*, are often found on the submerged piles not far below the water surface

structure somewhat lower than that of a mollusk so far as complexity of organization is concerned, they are actually primitive members of the chordate group which includes the vertebrates and culminates in man. Their true relationship is shown by their life history according to the principle that an animal in its development tends to summarize certain of the changes that its ancestors have undergone in evolution: their young when first hatched are free-swimming, with tadpole-like tail, well-developed median eye, "brain" and central nervous system of the primitive chordate type, and the most striking indication of their affinity the larval notochord, or cartilaginous prototype of a backbone. As the animal approaches maturity however, it attaches itself to some stationary object, by means of sucking disks upon its head. It then undergoes a metamorphosis which involves the breaking up and degeneration of "brain," special sense organs and notochord while the nervous system is reduced to little more than a single ganglion. On the other hand the digestive system is rotated upon itself and together with the circulatory system and other organs, becomes adapted to the future sedentary life of the animal.

As in the case of the hydroid, the organization of the adult ascidian is chiefly that of a digestive and reproductive machine, but that it is of a much higher type than the polyp is evident from the relatively high specialization of its digestive apparatus.

Thus in an association of animals like that of the wharf piles, in which the various species are adapted to a sedentary existence and a diet of microorganisms, there may be three principal categories of forms,—first, those like the polyps which have reached the adaptation as the result of an evolution from still lower types; secondly, those like the tube-building serpulid worms and the bivalve mollusks, which have become greatly specialized to that mode of existence without much loss of complexity; and thirdly, those like the ascidians, which have undergone a considerable degeneration from a former more complex and highly organized type of structure.

Such an association also emphasizes the general tendency throughout the great groups of animals to take advantage of all the available sources of food supply in their environment. The microorganisms of the sea seem especially suitable as prey for the smaller and more primitive members of the animal kingdom like the sponges and polyps. Yet among the echinoderms, worms, crustaceans, mollusks, ascidians, chordates and even fishes (such as menhaden), there are certain forms in each group which have found it of advantage to share this great abundance of food. Thousands of microscopic creatures may swarm in a single drop of sea water; and in the course of time the species that feed upon them have become more and more perfectly adapted to this diet, often to the extent of undergoing profound modifications of structure and habits of life.

## THE NEW WHARF-PILE GROUP

*[Editorial comment and notes on the construction of the group]*

FROM the standpoint of faithful reproduction of nature, there is no group in the American Museum of Natural History that surpasses the new marine group constructed under the supervision of Mr. Roy W. Miner. From the standpoint of general artistic effect, there is no very large number perhaps that compare with it. It is without doubt one of the most beautiful groups thus far constructed in this Museum, although differing so greatly in character from the three or four masterpiece mammal groups, the habitat bird groups and the frog group that comparison is difficult.

Its chief claim artistically, outside of what is inherent in the subject itself, lies in its handling of color and illumination. These have been so controlled as to produce distance in the scene above water and a depth and gradation of depth that give very unusual illusion under water. The splendid success of the group results in large part of course from the clever management of mechanical details of construction, and it may be said that there are few blemishes to be discovered by even the most critical eye. What this implies in an intelligent control of technical work can scarcely be appreciated except by the trained museum man, although a comparative study of groups in many museums will enforce the fact of the exceptional excellence to the most casual observer.

The following notes given by Mr. Miner concerning the mechanical work on the group will be enjoyed both by those who are directly interested in Museum constructive work and by the visitor who is merely curious as to how realistic effects have been produced:

The group is based on actual observations in the Woods Hole region, the life depicted being a faithful copy of that actually seen on the piles of wharves, especially on abandoned wharves whose piles have not been scraped. The abundance and beauty of this life are in no way exaggerated in the group and the life associations shown are possible anywhere in the Woods Hole region, although most of the direct studies were made at Vineyard Haven, six miles from Woods Hole village. In the field a miniature sketch model showing the composition of the future group was constructed. Then living specimens of the animals were removed from the piles and brought into the laboratory where they were kept alive in sea-water aquaria. Studies were made of them with and without the microscope, and they were sketched in color and photographed. The Museum photographer in New York was sent for to make the photographs for the transparency backgrounds, while dissections and enlarged drawings were prepared for use in constructing enlarged models for the accompanying synoptic series in the Darwin hall.

At the close of the summer season in the field, work on the group was continued in the Museum. First a wooden framework for the full-sized group was made by the

Museum carpenter, on which enlarged photographic prints were stretched as preliminary backgrounds to enable harmonizing the foreground construction with the natural perspective. The animal life in the group is represented by an assemblage of models except in the case of hard structures such as shells. The mussels on the piles are the actual specimens which were preserved in alcohol and afterward taken apart, the soft portions cleaned out and the shells reassembled with wax and cotton. The worm tubes are the natural dried specimens recolored. The starfish was also dried and prepared with a wax foundation, the tube feet being modeled in glass and inserted. The tubularian hydroids were all separately blown in glass and welded together in colonies, the sketches made in the field and the original alcoholic specimens being used as patterns. The color was sprayed on with the air brush, the finishing touches being made by hand in the usual manner. Some of the ascidians (for example, *Ciona tenella*) were blown in glass and their internal organs were modeled in the same material and inserted separately. Hundreds of tentacles for the sea anemones, cirri for the serpulid *Hydroides dianthus*; and even some of the seaweed are also the work of the glass-blower, but perhaps the best work in this line is the modeling of the jellyfish and the squid. The former is entirely of glass and is a masterpiece of the glass-blower's art, while the peculiar translucency of the squid's body could be attained by no other medium. The coloring of these two models by the Japanese artist is also a triumph of skill.

Much of the animal life however was modeled in such materials as wax and celluloid. The ascidian, *Molgula*, the colonies of the red beard sponge and the greater part of the sea anemones are of wax, while the delicate hydroid, *Bougainvillia*, and the green network colonies of *Perophora* are made of a combination of wax and German silver wire handled in most delicate fashion. One of the most creditable pieces of work, the accurate modeling and coloring of the wharf piles themselves, is the work of Mr. I. Matausch, who is also responsible for the technical skill in assembling and anchoring the hundreds of separate models and specimens in their final positions.

The coloring of the transparencies proved a problem peculiar to itself, involving the application of transparent oil colors, selected for their permanency under strong sunlight, to the surface of glass covered with a delicate photographic film (in the case of the transparencies represented as above the water line), and to the smooth surface of plate glass for the submarine background. This latter background is made up of five successive sheets of glass, each colored in such a manner that the daylight passing through the entire series gives the effect seen when looking horizontally through the waters of the ocean. The color effect for this part of the group is based on actual observation in the sea itself made with the help of a water glass and submerged mirror. Fishes, squid and a distant pile were painted on the successive plates of glass, thus giving them the lifelike effect of appearing suddenly from the gloom of the green sea depths. Since the whole group was placed in front of a window, the illumination is entirely that of the natural daylight, as transmitted through the various backgrounds. The cloud and sunshine and various outdoor light conditions in general thus produce their natural effects as they filter through the translucent backgrounds of the group.



## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Benefactor*, PROF. HENRY FAIRFIELD OSBORN;

*Associate Benefactor*, MR. A. D. JUILLIARD;

*Fellow*, MR. FREDERIC C. WALCOTT;

*Honorary Fellows*, CAPTAIN ROALD AMUNDSEN, ADMIRAL ROBERT E. PEARY;

*Life Members*, REV. ARTHUR HUNTINGTON ALLEN, MESSRS. WILLIAM F. BELLER, WARREN DELANO, D. K. ESTE FISHER, JR., FRANCIS P. GARVAN, CHARLES E. HANAMAN, CHARLES B. ISHAM, OGDEN L. MILLS, EDMUND PENFOLD, JOHN J. RIKER, ARCHIBALD D. RUSSELL, HERBERT F. SCHWARZ, ALBERT JAMES SHELDON, HOWARD CASWELL SMITH, WILLIAM BOYCE THOMPSON;

*Sustaining Members*, MRS. HELEN HALL VAIL and MESSRS. JOHN F. HARRIS and FREDERICK STURGES;

*Annual Members*, MRS. J. SCOTT ANDERSON, MRS. ELMER E. BLACK, MRS. H. L. BLUM, MRS. JESSIE B. CAMERON, MRS. REBECCA McM. COLFELT, MRS. WILLIAM D. GAILLARD, MRS. W. PIERSON HAMILTON, MRS. JOHN HAYS HAMMOND, MRS. ALFRED JARETZKI, MRS. ADAM LEROY JONES, MRS. AMANDA F. LAUTERBACH, MRS. CASIMIR DE R. MOORE, MRS. BRADFORD NORMAN, MRS. W. A. PAYNE, MRS. CHARLES G. STODDARD, MRS. GEORGE F. VIETOR, MISS ALICE M. DAVISON, MISS CAROLINE B. DOW, MISS FLORENCE WIER GIBSON, MISS SOPHIE HOFFMAN McLANE, MISS BERTHA V. MERRICK, MISS MARJORIE T. SINCLAIR, MISS ANNIE STONE, DR. WILLIAM B. DUNNING, DR. HOWARD LILIENTHAL, DR. ARNOLD STURMDORF, and MESSRS. J. S. ALEXANDER, A. K. ALFORD, W. H. ANDREWS, HUGH POTTER BAKER, HERBERT BARBER, THOMAS HENRY BAUCHLE, JR., ANDREW A. BENTON, H. HENRY BERTRAM, ARTHUR C. BLAGDEN, HUGHES BRYANT, EDWARD BURNS, WILLIAM CARPENDER, PERCY M. CHANDLER, O. H. CHENEY, GEORGE A. CRIDER, WILLIAM NELSON DAVEY, JOHNSTON DE FOREST, DAVID DOWS, FREDERICK L. ELDRIDGE, BENJAMIN F. ELGAR, 2d, R. K. FORSYTH, HUGH F. FOX, DOUGLAS W. FRANCHOT, JOSEPH FRANK, FRANK B. GILBRETH, W. S. GORDON, J. S. HALLE, CHARLES HATHAWAY, SAMUEL B. HAWLEY, W. DEF. HAYNES, EDGAR C. HEBBARD, JOHN B. HENDERSON, JR., SIMON HESS, GRANGER A. HOLLISTER, E. COE KERR, LUCIAN S. KIRTLAND, EDWARD H. KRUSE, FREDERIC S. LEE, LOUIS S. LEVY, FRANK J. LOESCH, C. A. LUDLUM, ADAM K. LUKE, C. N. MASON, JOHN C. MCCALL, GEORGE R. MCCLELLAN, THOMAS P. MCKENNA, FRANCIS W. McMILLAN, PAUL B. MORGAN, H. D. NESSLER, GEORGE P. PUTNAM, JAMES RASCOVAR, J. D. ROCKWELL, AUGUSTUS J. ROLLE, WILLIAM P. ROOME, P. D. SAKLATVALA, ISADORE SAKS, LOUIS J. SCHILLER, EDWARD M. SCUDDER, WILLIAM E. SEYMOUR, WILLIAM G. SHAILER, JOHN SINNOTT, JAMES A. SWAN, MARCUS STRAUS, WILLIAM R. STROBEL, FRANK SUTTON, AUGUSTUS PORTER THOMPSON, CHARLES THORLEY, ARTHUR TURNBULL, OWEN WARD, H. WALTER WEBB, ARTHUR WILLIAM WEIL, JOHN C. WELWOOD, E. G. WHITAKER, GEORGE F. WILLETT, ALEXANDER S. WILLIAMS and JOSEPH WILLIAMS.

THE forty-fourth annual meeting of the trustees of the American Museum of Natural History was held on Monday, February 3, 1913, at the residence of Mr. Adrian Iselin, Jr. The following were elected officers for the coming year: president,

Henry Fairfield Osborn; first vice-president, Cleveland H. Dodge; second vice-president, J. Pierpont Morgan, Jr.; treasurer, Charles Lanier; secretary, Adrian Iselin, Jr. who succeeds Archer M. Huntington.

Mr. Frederick F. Brewster was elected as a new member of the board of trustees and the following members of the board were reelected: Mr. Albert S. Bickmore, Mr. Adrian Iselin, Jr., Mr. Thomas deWitt Cuyler, Mr. Ogden Mills and Mr. Madison Grant.

The executive staff of the Museum was reappointed as follows: director, Frederic A. Lucas; assistant secretary, George H. Sherwood; assistant treasurer, the United States Trust Company of New York.

THE American Museum has adopted a pension plan which will go into effect on March first. It is a departure in this country, the first instance recorded of a museum of sciences originating a pension system for the benefit of its employees. The idea was suggested to President Osborn by an investigation of the pension plans in operation in Europe. The committee which acted in the matter included the following trustees: Mr. Felix M. Warburg, Mr. Adrian Iselin, Jr., and Mr. Anson W. Hard.

In brief the plan is a contributory system, three per cent of the annual salaries being paid to the fund by the employees and a like amount by the corporation. The plan provides:

1. Pensions — Six classes of pensions according to length of service and age, the pensions varying from twenty-five to fifty per cent of the average salary of the last three years.
2. Health Insurance — Gratuity to the employee in case he is totally disabled through illness, or his position is abolished.
3. Life Insurance — Gratuity to a beneficiary, in the event of the death of the employee, and under certain conditions in the event of the death of a pensioner.
4. For the return of the employee's contribution with simple interest at three per cent in case the employee leaves the service of the Museum before he is eligible for a pension.

AT the annual meeting of the board of trustees, Mr. A. D. Juilliard was made associate benefactor of the American Museum in recognition of his generous contributions and continued activity in matters that tend toward the growth of the institution.

THE Jesup lectures on "Heredity and Sex" by Dr. Thomas H. Morgan, professor of experimental zoölogy in Columbia University, began in the auditorium of the American Museum, February 5 and will continue to be given on Wednesday evenings until March 26. The subjects of the series are as follows:

- February 5 — "The Evolution of Sex"  
 February 12 — "The Mechanism of Sex Determination"  
 February 19 — "The Mendelian Principles of Heredity and their Bearing on Sex"  
 February 26 — "Secondary Sexual Characters and their Relation to Darwin's Theory of Sexual Selection"  
 March 5 — "The Effects of Castration and of Grafting on the Secondary Sexual Characters"  
 March 12 — "Parthenogenesis and Sex"  
 March 19 — "Inbreeding and Fertility"  
 March 26 — "Special Cases of Sex Inheritance"

MR. VILHJÁLMUR STEFÁNSSON will sail early in March for Europe where he will purchase a part of the scientific equipment for the new Arctic expedition. He will address the Royal Geographical Society while in London and later attend the International Geographical Congress at Rome as delegate of the National Geographic Society.

A RECEPTION at the Museum on the evening of February 26 marked the opening of the exhibition of collections, paintings and photographs illustrating the daily life and ceremonies of the Indians of the Southwest. In this exhibition the following complete collections are placed on view for the first time: The Collis P. and Archer M. Huntington collections; the Anson W. Hard serape collection; the J. P. Morgan Navajo collection; the Mrs. Russell Sage blanket collection; the James Douglas basket collection; selected specimens from the Hyde archaeological collections and the Lumholtz Mexican collections.

Among the pictorial exhibits are a series from the Morgan collection of Curtis prints and one from the Museum collection of Karl Moon photographs. The late Louis Akin is represented by paintings loaned by Messrs. C. L. Le Fevre, G. H. Frommann, Goelet Gallatin and W. H. Simpson. The following artists have loaned examples of their work: Ernest L. Blumenschein, R. W. Chanler, Kate Cory, E. Irving Couse, E. W. Deming, Howard McCormick, Bert G. Phillips and Mahonri M. Young. The exhibition will remain open to the public until March 26.

THE Museum has announced to the principals and teachers of the New York City schools a series of lectures grouped in three courses in accordance with the new method adopted in the fall. The lectures will be given by the members of the Museum staff and will specialize on the history and geography of the United States and New York City. They will be illustrated with lantern slides and moving pictures.

THE Instituts Solvay, Bruxelles, in its last *Sociological Bulletin* published extracts and translations in French of Dr. Wissler's recent Museum publication on the "Ceremonial Bundles of the Blackfoot Indians." Two full pages of illustrations and some text figures were also reproduced. The parts of the paper dealing with the social aspects of certain religious ceremonies were regarded as important sociological contributions.

A series of natural history picture stories has been arranged for the children of members of the Museum. These are designed primarily for entertainment, yet through the pictures taken from life hope to teach something of the habits of wild creatures and the relationship and interdependence of all life. They will be given on Saturday mornings in the auditorium of the Museum and will be illustrated with moving pictures. The stories will be as follows:

- March 1 — "Jungle Scenes in Africa, India and Borneo," by CHERRY KEARTON
- March 8 — "Wild Animal Neighbors," by ERNEST HAROLD BAYNES
- March 15 — "A Monkey on Safari," by CARL E. AKELEY
- March 22 — "Poonkong and his People," by PLINY E. GODDARD
- March 29 — "Our Friends the Trees," by GEORGE H. SHERWOOD

A SHIPMENT of birds and mammals has been received from Mr. W. B. Richardson, who has been collecting for the Museum in Ecuador.

DR. W. S. RAINSFORD, in charge of the Museum's third African expedition, reports that he has been successful in securing a large series of specimens, including the black rhinoceros which was one of the special objects of the expedition.

DR. R. M. ANDERSON was appointed assistant in the department of mammalogy at the February meeting of the board of trustees. Dr. Anderson will accompany the Stefánsson expedition to the Arctic as zoologist and second in command.

MR. J. H. O'NEIL, assistant in the department of public health, has resigned to accept an appointment as sanitary engineer of the State Board of Health of Louisiana. His place is taken by Mr. D. Greenberg, a graduate of the College of the City of New York.

DR. W. D. MATTHEW of the department of vertebrate palæontology left on February 3 for a month's trip to Los Angeles, California, where he is to study the famous asphaltum pools of Rancho La Brea in connection with a group now under preparation in the department. He hopes also to effect exchanges with California institutions which have done excavating at La Brea ranch, whereby the Museum may acquire additional specimens of the wonderfully preserved Pleistocene fossils which these asphaltum pools contain. The Museum's present collection from these deposits, obtained through exchange, includes skeletons of the saber-toothed tiger and an extinct species of wolf and a skull of the ground sloth. Dr. Matthew is taking advantage of the opportunity to visit en route the museums of Pittsburgh, Chicago, Lincoln, Laramie and San Francisco.

DR. C-E. A. WINSLOW has recently been elected president of the Society of American Bacteriologists.

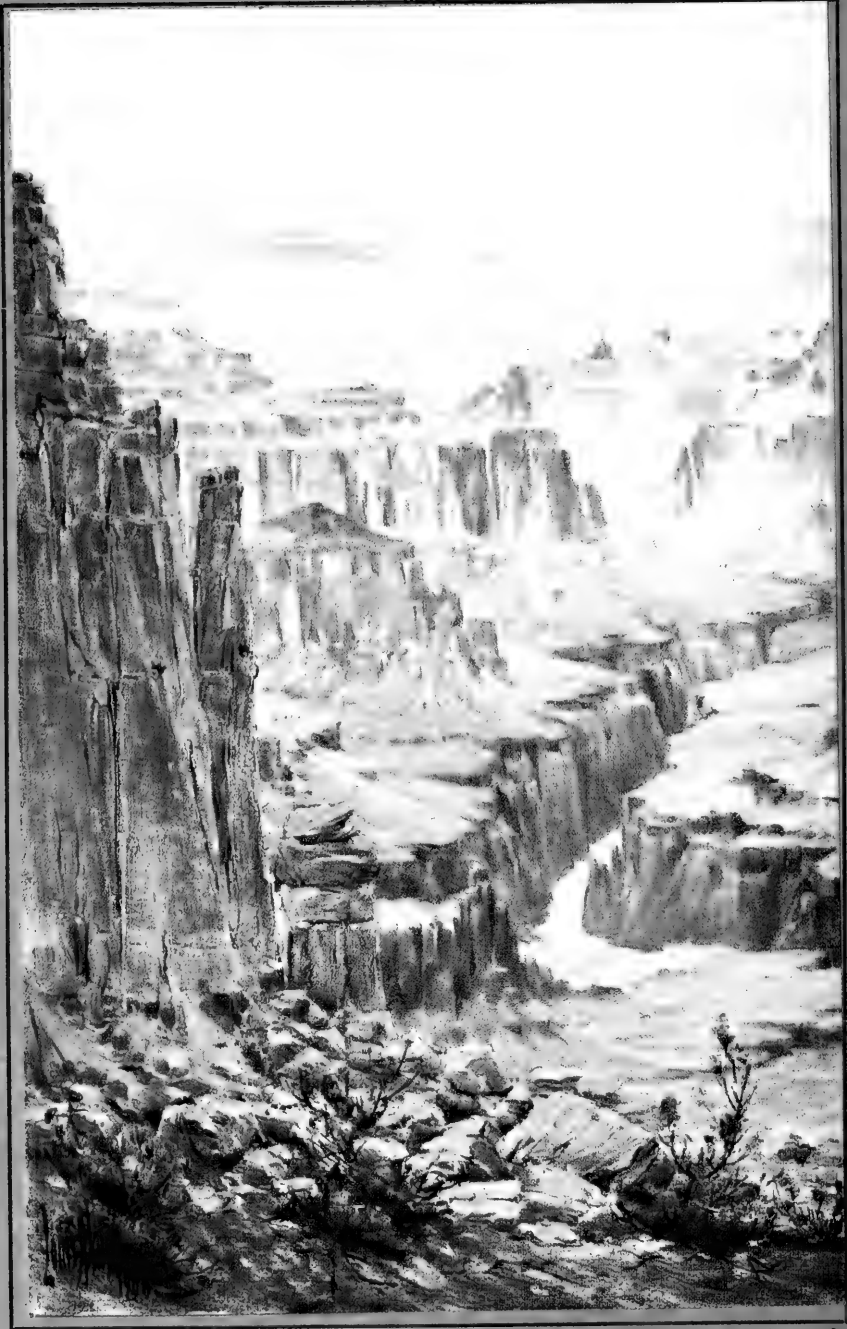
DR. R. W. SHUFELDT of Washington, who is well known as one of the few authorities upon fossil birds in this country, has completed a revision of the Pleistocene fossil birds in the American Museum collections and is now engaged upon a study of the Tertiary bird specimens. Fossil birds are extremely rare and Dr. Shufeldt's contributions will add materially to one of the least known chapters of the history of life. Among the specimens in his hands for study are a few fragments of a gigantic bird from the Lower Eocene equalling in size the extinct moa of New Zealand. This specimen was found by the Museum expedition in Wyoming last summer, and some more or less imaginative notices of it have appeared in the daily papers. The full results of Dr. Shufeldt's studies will appear in the *American Museum Bulletin*.

DURING the past month there have been a number of additions to the collections of the department of mammalogy. Thirty-five of the great fruit bats from the Philippine Islands with complete accessory material for a group have been received. These bats are found in rookeries consisting at times of as many as fifteen or twenty thousand individuals. The collections made by Dr. Rudolph M. Anderson in the Arctic have arrived at the Museum. Among them is the magnificent series of barren ground bear which has already been noted in the *JOURNAL*. Also the northern Korea collections of mammals made by Mr. Roy C. Andrews, have arrived in New York safely after what proved to be an adventurous voyage from the Orient.

MR. CLYDE G. FISHER of Johns Hopkins University, has been appointed assistant curator in the department of public education, the appointment to take effect on May 1, 1913.

ON Saturday afternoon, March 8, the Museum will tender a reception to the public school teachers who give their services for the after-school athletics of the girls' branches of the Public Schools Athletic League.





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### THE GRAND CAÑON

Canvas by Louis Akin, loaned to the Museum by the Atchison, Topeka and Santa Fé Railway Company for the Southwest exhibition, 1913

# The American Museum Journal

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NUMBER 3

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MARY CYNTHIA DICKERSON, *Editor*

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**The Journal is sent free to all members of the Museum.**

## THE MUSEUM'S NEW HANDBOOK SERIES

THE issuing of publications of a popular nature describing the more important or more interesting exhibits of the Museum, is a part of the educational work of the American Museum of Natural History. These publications supplement the labels by giving more detailed information than can be compressed into a few lines. The time of the visitor is often limited, he comes to the Museum first of all to see the objects; in a way these publications enable him to carry the exhibits home and study them at leisure.

The guide book is a sort of illustrated chart, like the maps of old, combined with sailing directions, telling where certain things may be found, with a few lines in regard to them and pictures of some things of especial interest. The illustrated guide leaflet goes a step farther and describes at some length a definite group of exhibits illustrating some interesting topic, such as the evolution of the horse, the bird habitat groups or the meteorites.

The recently issued *Handbook of the North American Indians of the Plains*, by Dr. Clark Wissler, is of a different character from the leaflets and marks a departure in the publications of this institution.

Handbooks deal with subjects, or topics, that are illustrated by exhibits rather than with the exhibits themselves. Thus the present handbook is not merely a guide to the Southwest Indian hall, although it notices and figures many of the more important pieces shown there; it describes the life and customs of the Indians. It tells of their material culture, of their food and how it is or was obtained, by the chase or by cultivation; describes their lodges, modes of transportation, dress, weapons and games. Other chapters deal with social organization, religion and ceremonies, telling of marriage customs, mode of government, societies, mythology, war and scalp dances, most of these being topics that cannot be shown by collections alone.

This *Handbook of the North American Indians of the Plains*, it is hoped, is but the first of a large number to be issued by the Museum. A second on the *Indians of the Southwest* written by Dr. Pliny E. Goddard came from the press at the time of the Museum's Southwest exhibition. That on *Mexican Antiquities* is nearly ready, and the *Evolution of the Horse* now in press, although issued in leaflet size on account of the illustrations, is really a handbook. Such handbooks may well be used as text-books on the subjects of which they treat, the more, that being written by men thoroughly conversant with the subjects, they may be looked upon as authoritative.



# The American Museum Journal

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No. 3

## ART IN A NATURAL HISTORY MUSEUM

WITH SPECIAL REFERENCE TO MURAL DECORATIONS  
IN THE INDIAN HALLS

STRANGERS in the American Museum knowing only the old type of natural history museum might well ask how it comes about that an institution of science contains so much that is art. The explanation is not far to find. It lies in this particular museum's conscious educational trend by which it attempts to make its exhibits attract the masses of people, who are without scientific training and probably have no especial scientific interests. If any non-compulsory educational institution is to prove effective, it must give the knowledge it wishes to impart a guise of unusual fascination.

This fact has been realized by the Museum, particularly during the past dozen years. In consequence, artists and sculptors have been brought in to cooperate with the scientist, as for example in the panoramic bird groups, which have attracted world-wide attention. In fact the so-called "group" method of exhibition has produced what in some cases may well be termed works of art, a new type of story-telling "picture" consisting of real landscape — a site selected and reproduced for artistic as well as scientific reasons — blending with an artist's canvas.

Attractiveness however has not been the only motive underlying the evolution of the present American Museum. A display of specimens, in cases, unrelated, is not only uninviting, it is also uninstructionive in that it tells only a small part of the truth. It can convey no idea of the life, in the instance either of animals or of primitive man. Thus the "group," which shows animals in relation to each other and to their native haunt, stands for manifolded power to convey knowledge.

But unfortunately the group idea when used to depict the life of primitive man, although it keeps its instructiveness as seen in the Eskimo groups in the North Pacific hall and the Indian groups in the Woodlands and Plains halls, tends to lose in artistic value. The Museum has not the space to isolate sufficiently groups of the size that these must be, the visitor must approach too near, and besides the difficulties inherent in the construction of the groups can scarcely be overcome. Human habitat groups call for the world's first talent to handle composition, color and light and still more to model the human figures and represent them not for form alone as in a masterpiece of bronze or marble but with the confusion of the motley color of realism added.



*Copyright, 1908, by Edward S. Curtis*

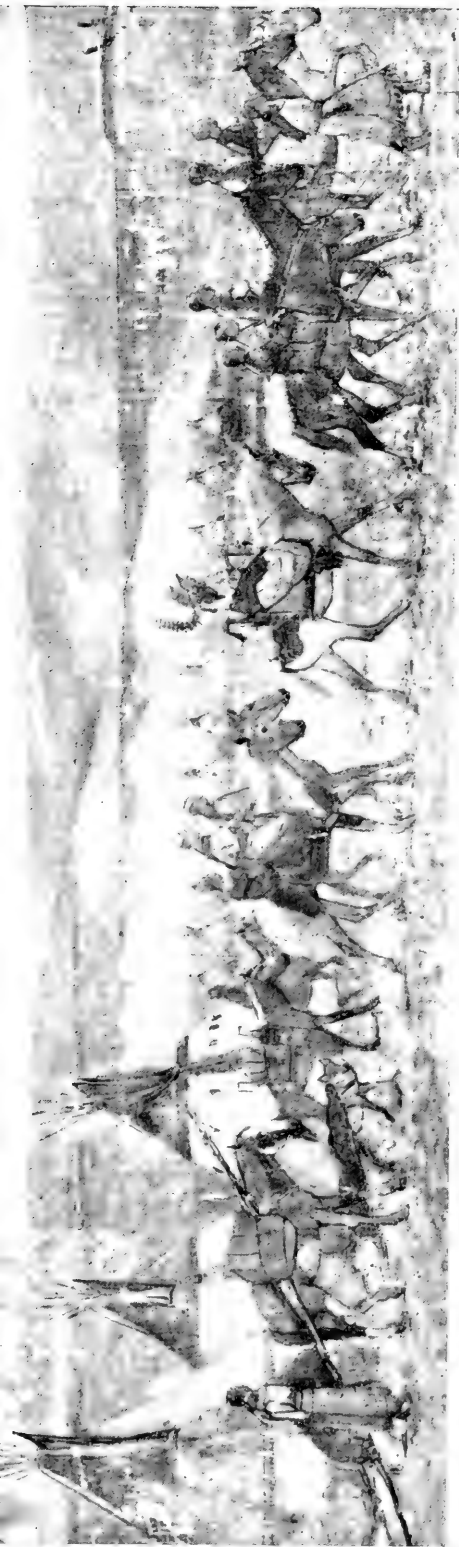
AN ARIKARA INDIAN

The Museum recognized this situation with regard to its anthropological exhibits several years ago and decided that in large part the province of telling the cultures and lives of the people represented in any hall must be relegated to mural decorations on the large wall spaces. Such paintings have after all, the full value of a group. In a bird group it is desirable to have mounted specimens in the foreground because the structure of the bird is one of the essential points in the exhibit. In the case of the American Indian, on the other hand, the anatomical differences from the white man are so small and have so little cultural significance that they are quite secondary. What are essential and cannot be told except on canvas are the natural environment in which the Indian lives, his village spread over a wide area and his stately ceremonies and weird dances. It is only through the aid of the artist that the mythology of the Indian can be interpreted, and the artist's success is directly dependent on his knowledge and the degree in which he enters into the spirit of Indian life. Decorations in the Indian halls must possess archæological and ethnological accuracy as the first consideration; after that the artist is free to give a poetical and more or less mystical interpretation.

The plan of mural decorations in the Museum was first tried out in the Eskimo section with F. W. Stokes as artist and is now being extended to the Indians of Alaska and the North Pacific coast in a remarkable series under the brush of Will S. Taylor. At present plans are being prepared for a continuous series around two other Indian halls, the Plains and the Southwest. E. W. Deming has made studies for the Plains hall. Louis Akin for two years previous to his death had worked on studies for the Southwest hall and that these studies had not been transferred to the Museum's walls is a fact greatly to be regretted.

As a subject for American art there could be none greater than our American Indian of the past — if the artist but understand him. Few people perhaps do this. Here and there a man with the heart of a poet, musician or artist — one who himself feels what the Indian felt when, wrought upon to energy by midday heat, subdued to reverence by night mists and the light of stars, he named the sun his father and the earth his mother. Centuries have dulled for civilization the keenness of that unconscious susceptibility to nature and instinct which combines religious and poetic feeling with all the practical affairs of life and gives a simple nobility, faith and faithfulness such as was possessed by this race ranking many thousands of years behind the white race in cultural development.

The Indian has often been superficially and unfairly represented. The American Museum hopes to show in mural paintings the relationship of this primeval man to the vast isolation on the continent before the coming of the white man, and thus to provide a permanent historical record which shall be as truthful as science to-day can make it and as sympathetic as our American artists can reveal it.



Copyright by E. W. Deming

#### STUDIES FOR TWO LARGE PANELS IN THE PLAINS INDIAN HALL

The scene represents a visit by the Dakota-Sioux to a Blackfoot camp. The completed pictures will show the stately sweep of the great tribal camp circle. In the background will appear the curving lines of the hills on which buffalo are grazing as in the days when the Indian held undisputed sway over the entire western country. By such paintings it will be possible to represent in each hall the prevailing conditions under which the people there represented lived and by which their culture was largely controlled.

# THE INDIAN—A SUBJECT FOR ART

By E. W. Deming

Illustrations from canvases by E. W. Deming and photographs by Edward S. Curtis

THE Indian of the old time has passed away, although a few old men of the race still live, and we have certainly very little to be proud of in the record of our dealings with him. He received us with generous hospitality and has rarely broken a treaty with us, while we have seldom kept one. Every Indian war has been the result of our avarice. We have brought him disease which has killed off whole tribes as the Mandan were killed off in 1837. For civilization brought disastrous changes to this race too primitive to possess the necessary adaptability. The Indian was a meat-eater. Rapidly the supply dwindled under the encroachments of the white man and he was forced to depend on the "provisions" of civilization, seldom obtained first-class. He had lived in some rude habitation like the tipi which was a sanitary dwelling, never closed, with fresh air always coming in, and moreover continually moved from one place to another. The life that he now leads in houses which he keeps airtight has killed off a good part of every tribe. Many die of consumption.

We have cheated the Indian out of his land and his furs—worse than cheated him—we have traded him liquor and by this means debauched him. He was a great orator and although he has never had a historian, we get a glimpse here and there of the power of his speeches. He was a great hunter. He was a mighty warrior—we have adopted his mode of fighting. His mythology and folklore rank with the mythology and folklore of the white race.

It has been my good fortune since a time some fifty years ago to live with many tribes of this race, with Sioux, Crow, Blackfoot and Apache, most with the Indians of the Plains, with Pueblo and also with the Winnebago. I have hunted and shot with the members of many tribes, but could never come up to any in tracking. They honored me by adopting me into their tribes and in that way I came into close touch with Crow, Blackfoot and Sioux. But this is what I wish to say that in all this intimate knowledge of them I have never had an oldtime Indian betray a confidence. My grandfather, who knew Indians well throughout his life, said that he had never refused to trust an Indian and that he had never had an Indian betray his trust.

It is very difficult indeed for a white man to interpret the Indian's point of view, wholly impossible perhaps unless he lives with the Indian for many years. The death of Dr. William Jones has been one of the hardest blows to our knowledge of Indian history and mythology. He was part Indian and had the Indian's point of view together with the white man's, which he had gained through a good education. He was scientific as an observer.



*Copyright by E. W. Deming*

One of the decorations in Mr. Frederic C. Walcott's summer home in the Berkshire Hills, Norfolk, Connecticut. In the murals of this country house Mr. Deming has used the landscape and mythology of the immediate locality — a bit of the old time looking back one hundred and fifty years

In collecting Indian myths he knew the difference between the old and the transition myths. The Algonkin for instance have been under white influence for a hundred and fifty years and their myths have been greatly changed. It is only a man who really understands the Indian that can translate Indian mythology to carry a true meaning in the languages of civilization. Working with this man for many years helped me to understand the religion and poetic spirit of the red man and to appreciate old Indian customs.

But these old customs are practically gone. We cannot go out into the field to-day and study them. We find only transition customs. Neither are the oldtime customs obtained from books. All books on the Indian are narratives and histories written from the white man's standpoint, presenting but superficial ideas of ceremonial life.

The Indian was in perfect harmony with his environment. The sun was his father, the earth his mother, the animal his brother. Over all, the Great Mystery ruled. The Indian's every move was influenced by his religion. From the time a child was conceived, the mother's only thought was of the coming warrior — living a pure and simple life, making her appeal often to the Great Mystery in his behalf. When in his cradle, she sang songs of his brothers, the birds and the animals, and by the time he was ten years old he was instilled with a reverence and belief in the all powerful Great Mystery. After this the boy never spoke of what was sacred to him, yet the Great Mystery was always with him. When the youth reached manhood after purifying himself in the sacred sweat lodge, he went away from all of his kind to some solitary place and fasted with the hope that the underground and underwater people would come to him, the



*Copyright by E. W. Deming*

interpreters of the Great Mystery, to make him strong, brave and generous. In his emaciated condition and with his strong faith, the visions were real to him and influenced his whole life.

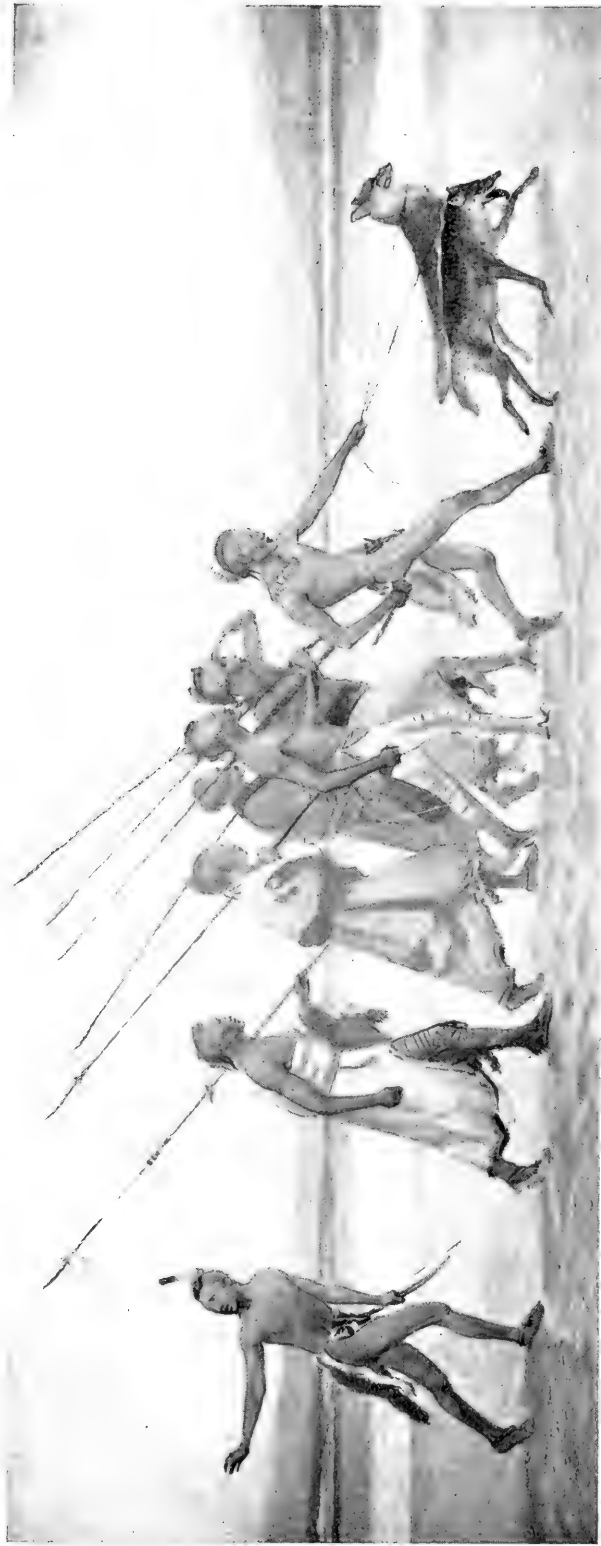
The white man owes the red man a debt greater than he can ever repay and is in honor bound to record as true a history of the oldtime Indian as possible, that future generations may know and appreciate this stone age people surviving until to-day.

There has never been in literature or in art a more splendid subject to treat. Here is a man different from any other, with deep poetic and religious tendencies but never a fanatic. It is this man and this race, as far as possible uninfluenced by civilization, that I wish to set forth in the decorations at the American Museum. With the Plains Indians I shall be able to eliminate everything of white influence. I have taken for the paintings that period after the horse was introduced. Horses were brought over in 1541. Afterwards they were stolen by Indians and began to drift north. The Indian at that time was in no way influenced by the white man.

Each panel of the series in the Plains Indian hall is planned to tell the story of a certain stock of Indians, the way of living, customs, decoration of lodges, life in the tipi, transportation, everything that can be told; besides a hundred little things that there is no record of at all, children playing with make-believe travois, animals, tame crows, around the camp — matters that give color and reality to the life. The Indian boy of to-day does not even know of these things with the changed way of living and the lack of the oldtime way of telling stories.

Other panels in the series will show the Sioux visiting the Blackfoot; a Pawnee hunting party coming in — the earth-lodge people; the return of a Comanche war party bringing in stolen horses; a sun dance, probably Cheyenne, typical of a religious ceremony; and a buffalo run with the Blackfoot and Sioux tribes.

Studies for mural decorations in the Southwest Indian hall of the American Museum have been made during the past two years by Louis Akin, and most unfortunate was his recent death. He was not only an interpreter of the Indian, but was also one of the few, almost the only artist, who realizes in his studies and pictures the romance and mystery of the wonderful country of the Pueblo Indian. As a co-worker in recording the Indian, I grieve for his loss, and for the delay that must follow in making that true pictorial record of the American Indian which both art and science demand.

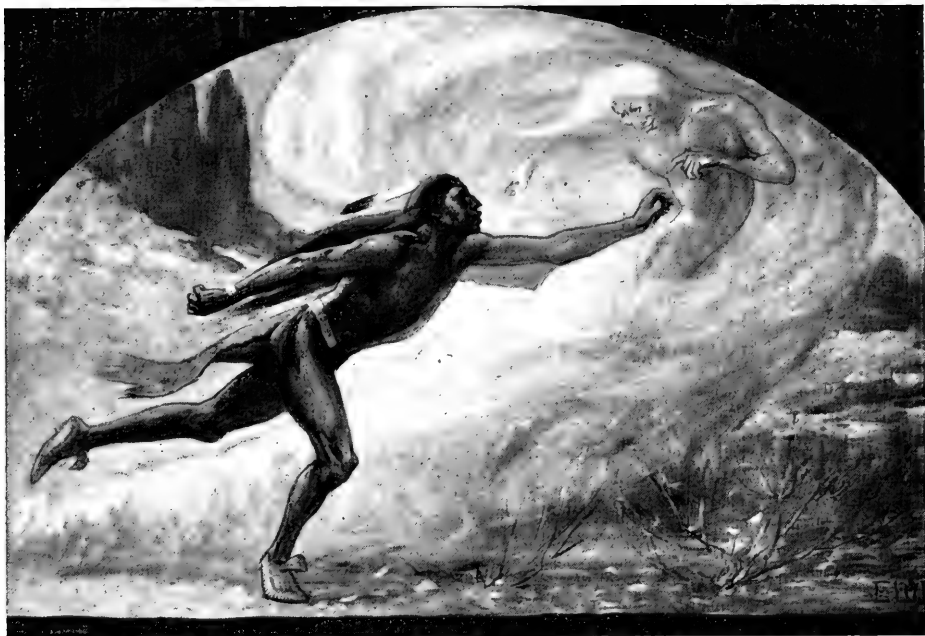


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### THE HUNTERS

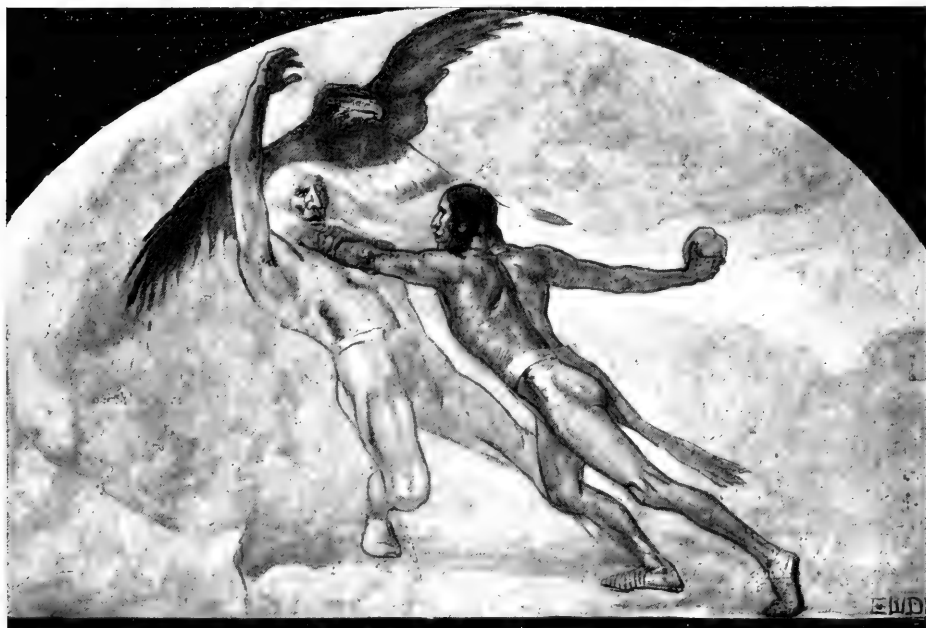
One of a series of mural panels (Mrs. E. H. Harriman, Arden House) showing the Algonkin Indians who lived along the Hudson in times past





*Copyright by E. W. Deming*

Manabozho (Longfellow's Hiawatha) chasing the spirit of mischief which escapes transformed to a whirlwind. Mural at Arden House



*Copyright by E. W. Deming*

Manabozho fighting the West Wind. Mural at Arden House



*Copyright by E. W. Deming*

**THE SONG OF VICTORY**

Commenting upon this celebrated painting Herman ten Kate says, "Five naked warriors, apparently Sioux, are returning in mad gallop from the battlefield. The chief in their midst, covered with his gaudy war-bonnet, and his eagle-feather wand in his outstretched arm, they are wild with joy, while their martial song is carried by the winds to their lodges".



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### THE VISION

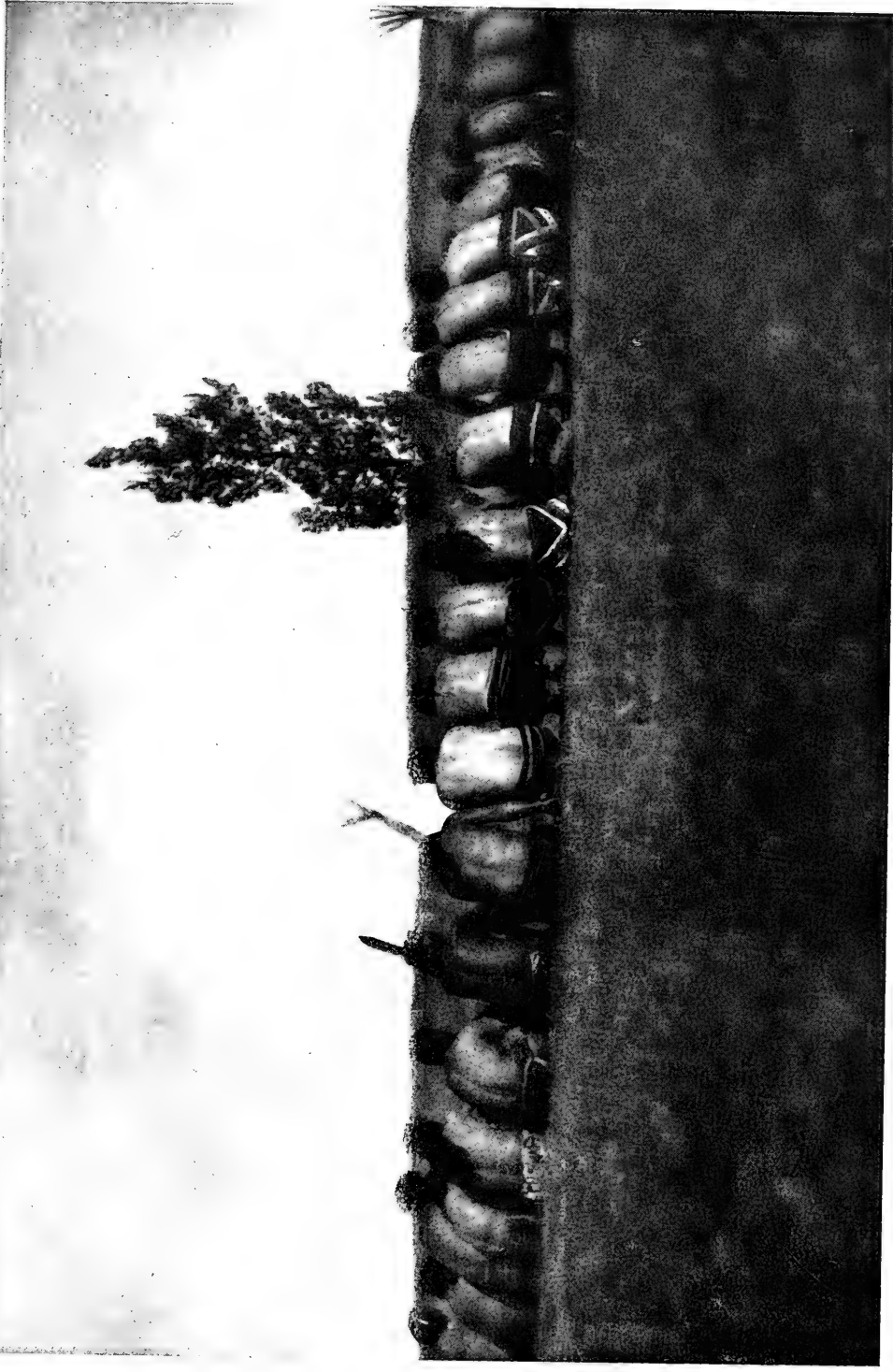
Among the Indians of the Plains and the Eastern Forests it was the belief that supernatural help and guidance were to be obtained by strong personal appeals to the various powers above. The method usually followed was for a man to go out alone and fast for at least four nights and days, calling out and beseeching all the powers of the earth, water and air for help. A pipe was kept ready to offer to such spirits as might appear. In the picture we are shown the realization of a young man's fast at the moment when the mystical shapes of bear, buffalo, wolf and other animals rise over the crest of the hill



*Copyright, 1900, by Edward S. Curtis*

#### THE WILLOW-BEARERS FOR THE PIEGAN SUN DANCE

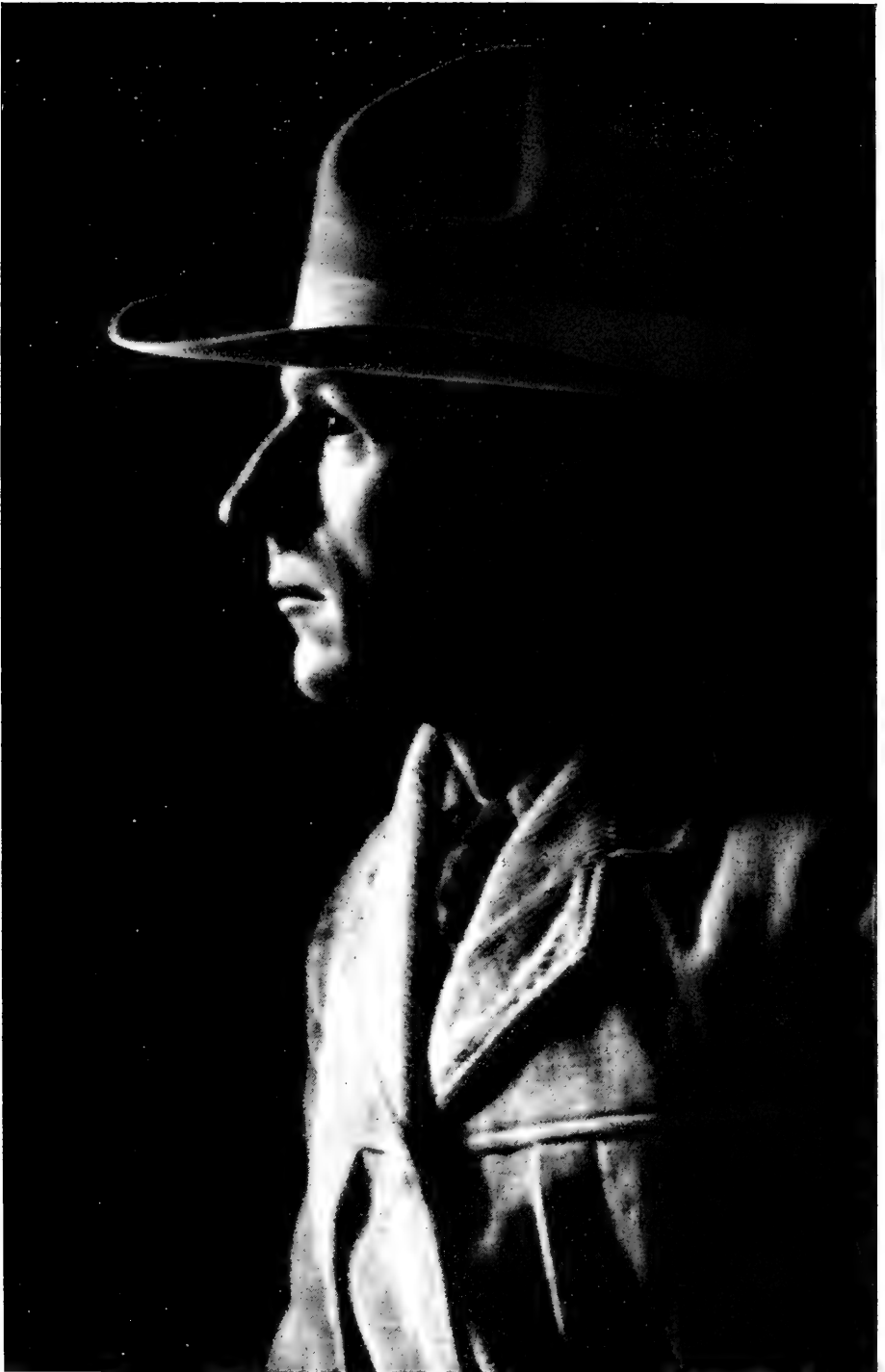
In the ceremonies connected with sun worship by the Blackfoot Indians of Montana a sweat-house frame is made of exactly one hundred willows. One of the young men's societies is delegated to secure the necessary willows. They bring them to the camp singing the songs for the occasion. After circling the camp they construct the dome-shaped sweat house in which purification ceremonies are performed. The photograph represents the procession as it nears the camp circle, the leader riding ahead of the line



*Copyright, 1908, by Edward S. Curtis*

**ARIKARA MEDICINE FRATERNITY IN PRAYER**

The members of this secret and sacred organization were in the habit of practising tricks of juggery which appeared miraculous to their fellow tribesmen



LOUIS AKIN, ARTIST

Born in Oregon in 1868; died at Flagstaff, Arizona, January 2, 1913

Quoting E. W. Deming, "He was not only an interpreter of the Indian but was also one of the few, almost the only artist, who realizes in his studies and pictures the romance and mystery of the wonderful country of the Pueblo Indian"

# LOUIS AKIN, AMERICAN ARTIST

WITH BRIEF QUOTATIONS FROM THE ARTIST'S LETTERS  
AMONG THE HOPI INDIANS

By Robert L. Warner

Illustrations from canvases by Louis Akin. [See frontispiece]

LOUIS AKIN was born in Oregon in 1868. By his death at Flagstaff, Arizona, January 2, America lost one of the foremost of its young painters. He died at the summit of his powers, his work but half finished. And that work is splendid. His colors are always delicate and harmonious, his canvases full of the mystery of the desert. At the time of his death and for two years previous, he was engaged upon the work of preparation of sketches in oil for the mural decorations of the new South-west Indian wing of the American Museum of Natural History.

He was one of my boyhood chums with whom friendship had endured up to the present, and I can perhaps appreciate the more his later triumphs in art from having observed the handicaps under which he struggled in early life. More than that of any other man I have known, his character typified passionate love of the great out of doors.

Louis Akin did not surrender to the conventions by which in general men are bound. His worldly affairs frequently became entangled in a skein of difficulties; his correspondence was often neglected, but when finally there came the answer to half a dozen letters long untouched, it was sure to be so many pages of delightful conversation, illustrated with comical marginal sketches, such a joy to read, that one was made ashamed of impatience and of his own feeble matter-of-fact communications. From one of his letters long ago I quote:

I have just found an old letter written by my mother to her sister, in the year 1867 from near Corvallis, Oregon. That was then the frontier. Said she, "As I sit in our cabin door, looking out across the little river, I can hear the singing of the waterfall, the sweetest sound in all the world for me." That was the year before I was born. Is there any wonder I have always loved the music of the streams, which was my earliest lullaby?

He first went to Oraibi, Arizona, in the latter part of 1903. I quote the following from a letter received from him a few months later:

... You see how I'm still holding down my little old stone house — I've outstayed my intentions long ago — but I'm good for say three months yet. It is simply too good to leave. I haven't done very much work till in the past few weeks — just soaking it in — getting familiar with all I can and finding out what to do and what not to. Now I'm getting at it in earnest. If I can only do the "blooming stuff" well enough! It's the best stuff in America and has scarcely been touched. I've seen some great ceremonies and rites — been in the thick of them — for I've made good friends with everybody.



"The Hopi Buckskin Man." Sketch in color by Louis Akin, presented in 1912 to the Camp-Fire Club of New York

cock-crow"), clad in blue overalls, much worn, and an old shirt, for he is an educated chap and takes to the white man's burden of clothes. Then they both knelt in front of the basins and his mother washed her hair and her mother washed his. Head washing is a feature of all their ceremonies and they all have wonderfully beautiful hair. When the hair had been partly dried, they bathed the bride's arms, shoulders and feet, and all present threw water which they had brought for the purpose over the groom. After that the two stepped out on the terrace, joined hands, cast a pinch of sacred cornmeal toward the sunrise and they twain were one. Now she will live at his house for two months, during which time he and his male relatives will weave two white robes and an elaborate white sash for her, which she will put on and wear to her own house — he following later, and they settling there. After the wedding I went home and still had an hour or two for sleep before sunrise.

To-morrow we have another "kachina" dance — thirty Indians or so from a branch settlement at Moenkapi, forty-five miles away, visit us for that purpose.

... These days we are having some wonderful sand storms, blowing up nearly every afternoon. Off here on the mesa we get little of them, but see the sand sweeping up the plains and piling drifts around the school and store buildings.

... I went to a Hopi wedding yesterday morning — the first I've seen. It was held at the groom's house, where, as is the custom, the girl had gone previously to grind corn for three days. I arrived in plenty of time, for only their mothers were up — though some other guests had already been welcomed. In front of the fireplace in one corner the two women had two large bowls of warm water and busied themselves working up a lather from crushed soap-weed root, while the balance of the family woke up and dressed. The bride's toilet consisted in rising in her blanket and putting on her belt — for they sleep in their one garment. About that time the man appeared from an adjoining room, yawning (for, mind you, this was at "first





CANVAS BY LOUIS AKIN

Loaned by Mrs. Goelet Gallatin of New York to the American Museum for the Southwest exhibition, 1913

*Copyright, 1913, by Mrs. Goelet Gallatin*



*Copyright, 1913, by W. J. Black*

#### THE TEMPLE — BY LOUIS AKIN

They all run in from there to-day — dance all night in the kiva — all day to-morrow out of doors and probably most of the night and half the next day; then run home the following day. Oh, but they're a husky lot! One of my best friends and neighbors, a snake priest, runs over there and back in a day easily.

Since the time of writing this letter Akin had been away from the desert only for short intervals at New York and during one trip into the Fraser River country of British Columbia, which we took together in 1909, he to paint and I to hunt sheep. Always, however, he kept in frequent correspondence with many of his old friends, and during this early winter contributed to the Buckskin Shirt dinner of the Camp-Fire Club at New York, a picture of a Hopi buckskin man which he described in a letter as follows:

It is a sketch in color — really a very correct “study” of the character. He is known as “So-we-ing-wa Ka-chi-na” and is one of the many demigods of the Hopi Indians. “Soweingwa” means “deer” and is also the common term for “buckskin.” He is the patron saint of the hunter and is a protector of game from natural enemies. With his rattle he warns of the approach of such as wolves and mountain lions, and with his trusty bow and arrow he slays the same when opportunity offers. With

his song he soothes the nerves of game animals with appeals to their vanity and comforts them with the assurances of the very great good and happiness they will be conferring on the Hopi by their death.

This kachina has not appeared in public for many years, and I had some difficulty in getting details. He finally consented to pose for me however, but without the headpiece, giving me permission to make drawings of that. It would be very sacrilegious to wear any kachina mark outside the proper ceremonial occasions.

Not long after this I received the following:

ZUÑI, NEW MEXICO, December 11, 1912

DEAR WARNER:

I have just settled on a fairly definite time for my return to New York — said time being almost the last of January. The Museum is to hold a special Southwest exhibition in February and they want to show my sketches then. I expect to stay about three months — want to get back here in May if possible.

I came in here from Hopiland ten days ago and will leave in a few days — probably to go to Phoenix and Grand Cañon for short stays, then eastward, stopping at two or three places for some photos on the way — places I haven't time to work in now, but must have some knowledge and data of to finish up my sketches after I get to New York. Goodnight!

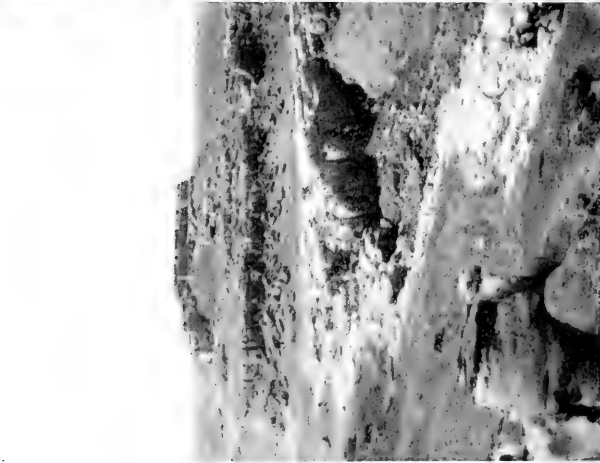
LOU

This was indeed his goodnight letter — the last letter received from him by any of his oldtime friends as far as I know; and for me the goodnight to a friendship which had endured almost from infancy.

As to the important work upon which he had recently been engaged, it must be a cause of gratification to all to know that his oil studies for this work were nearly completed. A friend who lived with him in Arizona during the last year of his life, has written concerning these sketches as follows:

“His work, all sketches in oil, is in my judgment complete. He brought with him on his return some twenty small paintings, the Indians in their dancing garb, Indian spinners and weavers, scenes in the pueblos, and one or two of the desert. These were intended for his larger work, and with a few exceptions are fully done, in colors.”

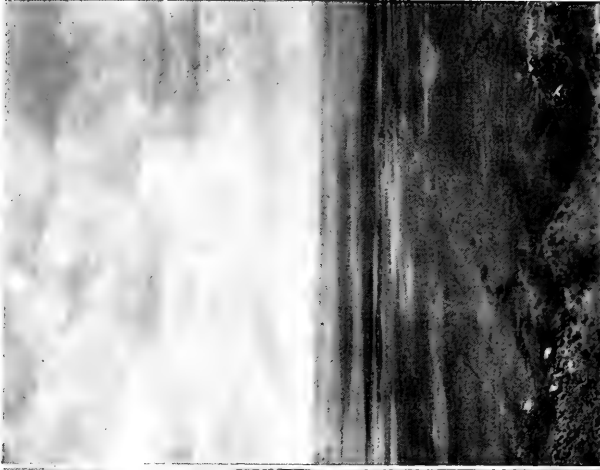
Mr. Akin was one of the American pioneers in organizing mountain lovers for coöperative effort, and in fact gave to the greatest organization of this nature in the Northwest about 1886 its name, The Mazamas. He had, before the time of that organization, built for himself a small hut away back in the heart of the cascades not far from the sloping glaciers of Mount St. Helena, and had studied the last of the Rocky Mountain white goats there. Most of his time however was spent in the Southwest. After he had lived with the Hopi a year or so, he was initiated into one of the secret societies of the young Hopi men, danced with them in their underground lodge room, the kiva, and ran with them on their visits to their neighboring villages. “Mapli,” they called him. Finally received as a member into the Hopi tribe, it is appropriate that his ashes should now rest upon the brink of the Grand Cañon, the spirit home of the Hopi.



The mesa upon which the pueblo of Shipaaulovi is built, rising from a level terrace that is itself several hundred feet above the plain. Horizontal beds of rock in the Southwest make possible such flat-topped hills or mesas



The Southwest is a land of deserts, mountains and wonderful clouds. The view is typical of the Tewa country with the Santa Fé Mountains in the background



Photos by Herbert J. Spinden  
Cloud shadows racing across the desert as seen from the pueblo of Walpi. The mythology of the Southwest is rich in cloud lore, and cloud pictures form an important part of the decorative art of the Indians

# THE ARTIST'S SOUTHWEST

By Howard McCormick

Illustrations of kachina and snake dance ceremonies from the Author's photographs

**H**UNDREDS of peaceful Indians in Hopiland trudge down the steep mesa sides to till their meager fields and carry their products to homes on the wind-swept tablelands, living a life of contentment and simplicity. Consider a civilization with no artificial social demands, no extended business contact such as fret and worry the white man; a place where no time is known except as marked by the daily position of the sun, where one day is like another in that each rising and setting of the sun is the occasion for a prayer asking for rain, good crops and happiness.

The artist's most adequate pen or capable brush becomes commonplace in registering impressions of Hopiland. The limitless sky with its gorgeous but subtle gradation of color is the one big impression of the mesa country. At the zenith a positive blue fuses into a cool blue green, then into yellow green, and finally into delicate lavender as it nears the horizon, only to be violently arrested by a long strip of distant mesa of almost pure cobalt. The sun beats down and illuminates the grayish-yellow sand with a brilliancy seemingly beyond the power of paint to suggest. On the yellow sand lie bones whitening in the sun, startlingly brilliant.



Paraders in the Anyah kachina ceremony, which is common to Zuñi and Hopi pueblos. There are a great variety of kachina beings or gods believed in and represented by the Southwestern Pueblo peoples. New conceptions of such beings wholly different from the oldtime Indian ideas are constantly being introduced. Navajo Indians and white cowboys even are represented for the amusement of the spectators



The kachinas are supernatural beings or gods, who live in the San Francisco Mountains and elsewhere, much as do mortals. From December until July they are represented by masked dancers in the Hopi villages in many ceremonies. The Niman kachina ceremony is the last of this series. The dancers wear masks and are decorated with evergreen boughs



The dancers representing the Niman kachina gods are receiving a farewell message before they withdraw from the Hopi villages



During the kachina ceremonies divine honors are paid the dancers as if they were the supernatural beings. Sacred cornmeal is thrown on them and they are addressed in prayer



The departure of the gods. The dancers of the Niman kachina are shown leaving the Hopi villages from which they are believed to be absent until the winter solstice



Antelope priests leaving the kiva or underground room, in which a very important part of the snake dance is held. Kivas are used by the Hopi men as clubrooms and workshops and for important ceremonies



The antelope priests are making the four fold circuit of the plaza during the ninth day of the snake dance. The chief priest who is leading the procession holds in his left hand the tiponi, a very sacred badge of his office and the "mother" of the priestly society





The snake dance of the Hopi is given by two orders of priests, the snake men and the antelope men. These two orders are shown drawn up ready for the singing which precedes the carrying of the snakes on the ninth day of the ceremony



The most spectacular part of the snake ceremony is the carrying of the snakes in the mouths of the priests. A large rattlesnake is firmly held near the middle of the lips. The priest who follows closely carries a snake whip of feathers with which he distracts the attention of the snake when necessary



When the snakes have all been carried in the dance, a large circle is marked on the ground with the sacred cornmeal, six radii are drawn representing the sacred dimensions, north, west, south, east, up and down. The snakes are then thrown into the circle and sprinkled with cornmeal

Sagebrush which may cover practically all the ground is a beautiful foil for the luminous sand and delicate sky. Mesas rise out of the plains like great eroded monuments, turrets and towers. Imagination is lame in picturing shapes as varied and weird as Nature puts into her rock formations. Pinnacles rise before a flat smooth mass of rock streaked with delicate horizontal lines. Erosion turns a spur of rock into a beautiful spindle or leaves a tracery of lace across the hills. It etches, slashes and undermines, tumbling boulders down to lie exposed for centuries and finally to be swallowed up by the sand.

The shadow of the first mesa glides across the plain changing the gray green sagebrush to olive and rests at the foot of the nearer purple mesa, orange-tipped by the setting sun. The day dies while yonder square-topped mesa glows like molten iron, deeper red and deeper until straining eyes question whether its color is entirely gone. The stars come out brilliantly in a moonlit sky. The artist spreads his blanket on the ground and lies for hours enjoying an Arizona night as wonderful as an Arizona day. All is quiet except for the baying of a mongrel dog; or perhaps a belated worker in the fields sings a weird song off on the distant plain, draws nearer, passes, the voice stilled as he refreshes himself at the spring, then continues the song as he goes up the mesa to his home, a pueblo in the clouds.

These people, adjusted so perfectly to their surroundings, furnish for the



At a signal the snake priests grab up the snakes and run with them down the trail leading from the mesa to the plains where the snakes are released. These snakes are supposed to carry a report of the ceremony and the honor bestowed upon them to the supernatural beings who control the rainfall

artist the human interest for his pictures. In their daily life and many ceremonies they reflect the colors of skies, the shapes of the clouds and mesas and fill both with innumerable supernatural beings.

But the Hopi are profiting by the example of the Navajo in acquiring sheep and some cattle and although modern scientific farming is a failure in their reservation they succeed in raising corn, melons and peaches. Changes due to civilization have rapidly been taking place in the ceremonial life of the people. We can but wonder how this ceremonial life has held out so long considering the pressure of the Government and the constant flow of returning students from the schools. But the few old men of the tribe retain their confidence in the primitive traditions and are not in the least shaken by the young men's statements of facts which run counter to their accepted beliefs. What answer is there to the fact that after three months of drought the participants in a dance for rain were drenched? That a repetition of the dance the following day brought more rain? And that in a circuit of the villages extending over more than one hundred miles, with one or two exceptions rain attended the visits of the dancers?

The Hopi men have now adopted white man's dress in their daily life. Automobiles carry the mails to within a few miles of the Hopi villages and soon the land will be overrun with tourists. From an artistic standpoint the Indian of the Southwest is surely disappearing and it will soon be necessary for the artist to reconstruct the customs and habits which may now be seen in their final stage of dissolution. We are grateful that yet a few in Hopiland retain their beliefs based upon centuries of close contact with nature and still live in a world of their gods.



*Copyright, 1912, by Rodman Wanamaker*

#### PROCESSION OF THE CHIEFS

By arrangements made at the instance of Mr. Rodman Wanamaker a few leading men from each of the Plains tribes were brought together for a general intertribal meeting or council. The chief purpose was to afford the opportunity for a permanent photographic record of these most representative Indians of the past régime. The picture here shown is but one of many taken under the direction of Dr. Joseph K. Dixon; the half-tone is reproduced from a photograph in the Wanamaker collection presented to the Museum

## A PAGE OF MUSEUM HISTORY

### DEVELOPMENT DURING THE PAST THREE YEARS OF THE AMERICAN MUSEUM'S WORK ON THE INDIANS OF THE SOUTHWEST

By Clark Wissler

Photographs by Pliny E. Goddard, Howard McCormick and Joseph K. Dixon

THERE has been much progress in the Museum's work in the Southwest since 1909 when Mr. Archer M. Huntington provided funds for investigation and collecting among the Indians of New Mexico, Arizona and Northern Mexico. Up to that time the Museum had done nothing in the Southwest since the Hyde expedition (1895-1900). The work of that expedition resulted chiefly in the collections obtained by the excavation of the prehistoric ruins of Pueblo Bonito which were unique in many respects. Among them we may mention the unusual number of turquoise beads and mosaics and the white and black cylindrical pottery jars, all of which form a part of the present permanent exhibit in the Southwest hall. Aside from a few random groups of specimens this was all the Museum had from the Indians of that region. The modern Pueblo Indians were represented by a small series of pottery, but little else, while from the Navajo and Apache there was scarcely a single piece except the Douglas collection of Apache baskets.

When funds for taking up systematic work came to the Museum in 1909, a plan was worked out for a vigorous attack upon the problems, both of the prehistoric and the historic natives. Among the historic peoples, very little had been done on the ethnology of the Rio Grande pueblos, though Hopi and Zuñi, farther west had been vigorously exploited by several museums. Although a great deal of collecting had been done by others among the Navajo and Apache, no one had made a serious study of these tribes. Several investigators had worked over a few localities containing the ruins of prehistoric peoples, but notwithstanding some very competent men were thus engaged, the field is so extensive that only a beginning was the result. In formulating a plan for future work, the Museum desired first of all, to take up problems not as yet begun by other institutions in the region, and least of all to break into the field already occupied by others. It was felt by all that if the Museum selected new fields its work could be made to coöperate with that of other institutions and thus advance the work of science as a whole. No one was then working among the Apache, Navajo and Papago of the more nomadic tribes, so this culture was taken as one of the problems. Dr. P. E. Goddard was called to the Museum from the University of California to take up the Apache, he being the best qualified man in the country for that work. His former work had been among the

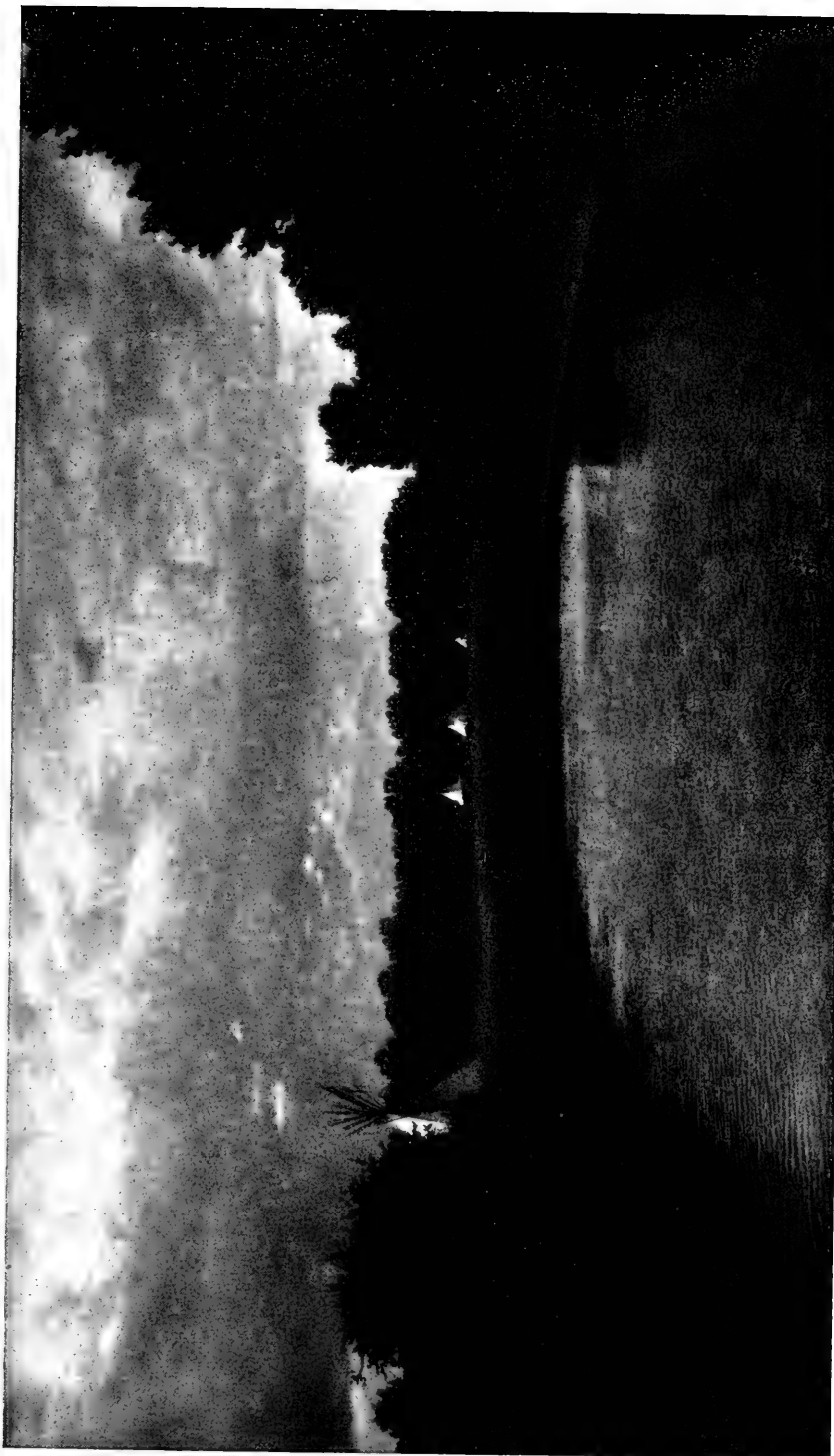
Athapascan-speaking peoples of California, Oregon and the Plains, all of whom speak a language similar to that of the Navajo and Apache. Miss Mary Lois Kissell, at that time special assistant in textiles but now of the University of California, was assigned to the textile problems of the Papago and Pima.

Among the Pueblo peoples the numerous villages of the Rio Grande Valley offered an almost virgin, though a very difficult field. Dr. Herbert J. Spinden was engaged to work up the art and material culture of these villages, he having at that time just completed a very important investigation of Maya art at Harvard University.

In addition to the problem of the living Indians, and in fact the real problem of the area, is the origin and history of the previous or ancient population. For some time it has been clear that the surviving Pueblo Indians were the direct descendants of the people who built many of the ruined prehistoric villages. In view of this it was planned to make our work effective by a study of the living or surviving peoples, and correlate the results with studies of the ruins. Mr. Nels C. Nelson of the University of California was engaged to carry on the prehistoric part of the work.

During the past three years the work has gone forward. The high development of art in pottery and weaving among all the tribes of the area and the abundance of pottery in the ruins, made it clear that in this phase of culture was to be found one of the most promising leads toward a correlation of the ancient and the modern Indians. Consequently a special effort has been made to collect specimens and information along these lines. The above-named members of the staff have brought together a representative collection, the greater part of which was on view during the recent special exhibit for the Indians of the Southwest.

What is of even more value, a considerable body of data has been brought together from the field and is now being worked over in the Museum laboratories. Dr. Goddard has issued a study of the Jicarilla Apache and a general handbook on the Southwestern Indians as a whole. Dr. Spinden has well under way a study of the industrial arts of the Rio Grande pueblo tribes, Miss Kissell is preparing a manuscript on the basketry of the Papago and Pima and Mr. Nelson is writing a report on the archæology of the Rio Grande Valley. These studies will eventually enable us to distinguish between the historic and the prehistoric elements of culture in the Southwest and to offer the basis for the determination of the prehistoric culture areas therein.



*Copyright, 1912, by Rodman Wanamaker*

**CROW INDIAN CAMP ON THE BANKS OF THE LITTLE BIG HORN**

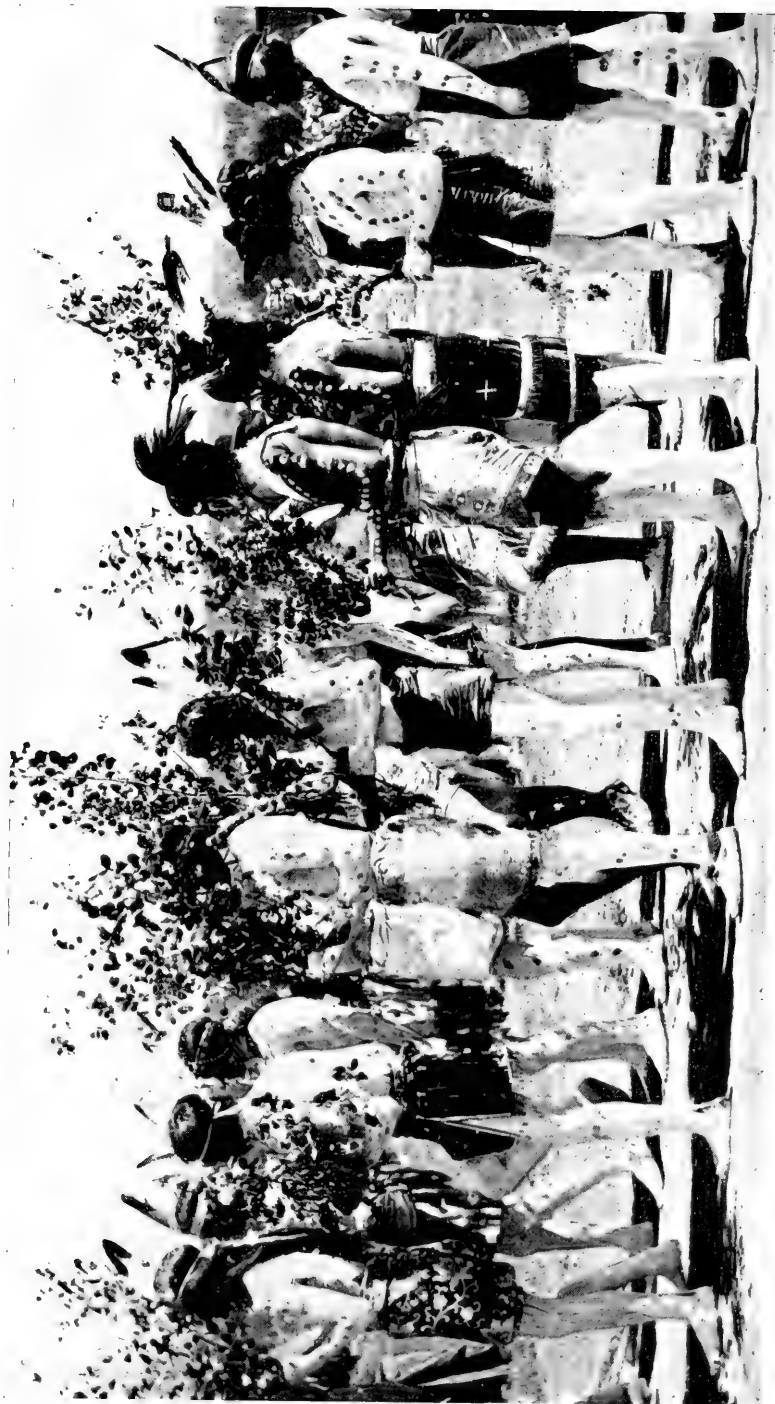
Reproduced from a photograph in the Wanamaker collection presented to the Museum



#### APACHE FOOT RACE

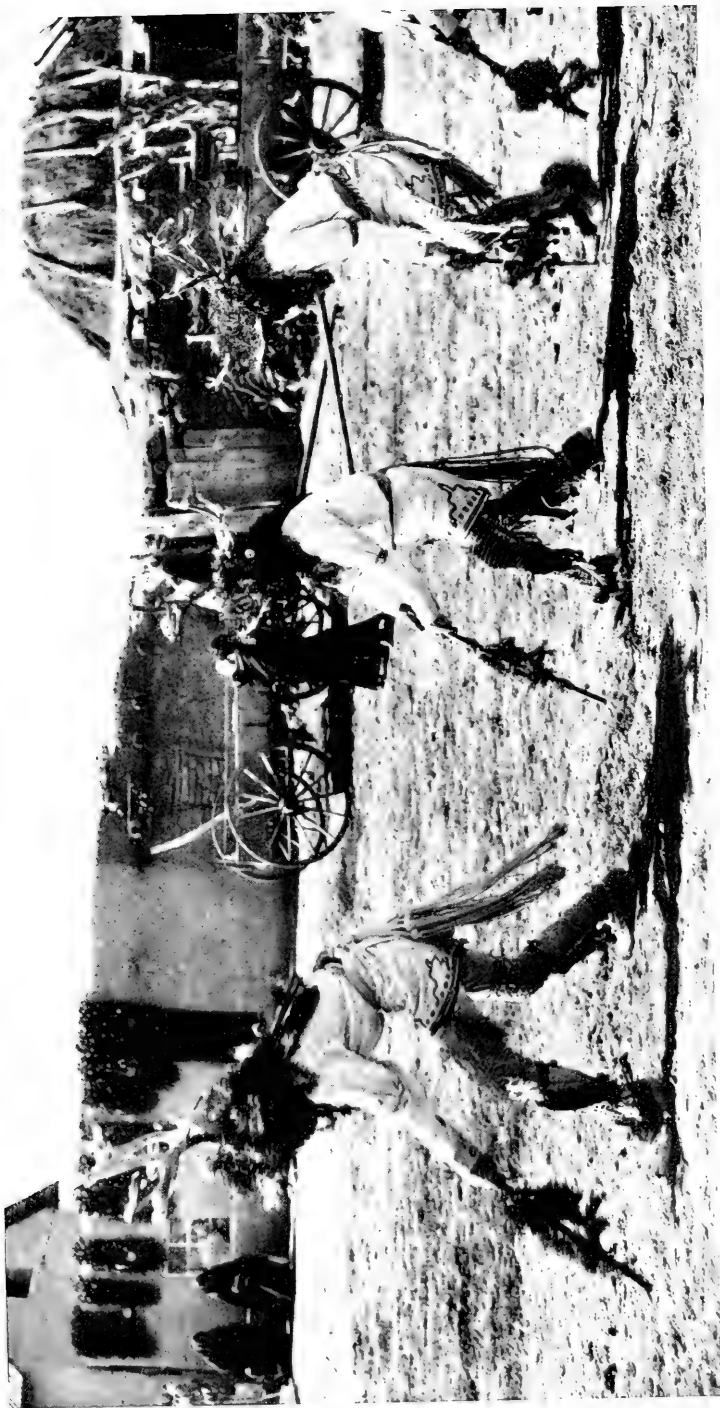
The Jicarilla Apache meet annually to hold a harvest festival. The chief event is a relay race in which the young men of one division of the tribe compete with those of the other division. After the race has been won, it is the custom for the racers to go again over the course at top speed.





### APACHE YOUTHS READY FOR THE RACE

These young men competing in the race are covered with white earth on which designs have been made with brown earth. An important ceremony is held for these racers previous to their public appearance



DEER DANCE IN THE RIO GRANDE REGION

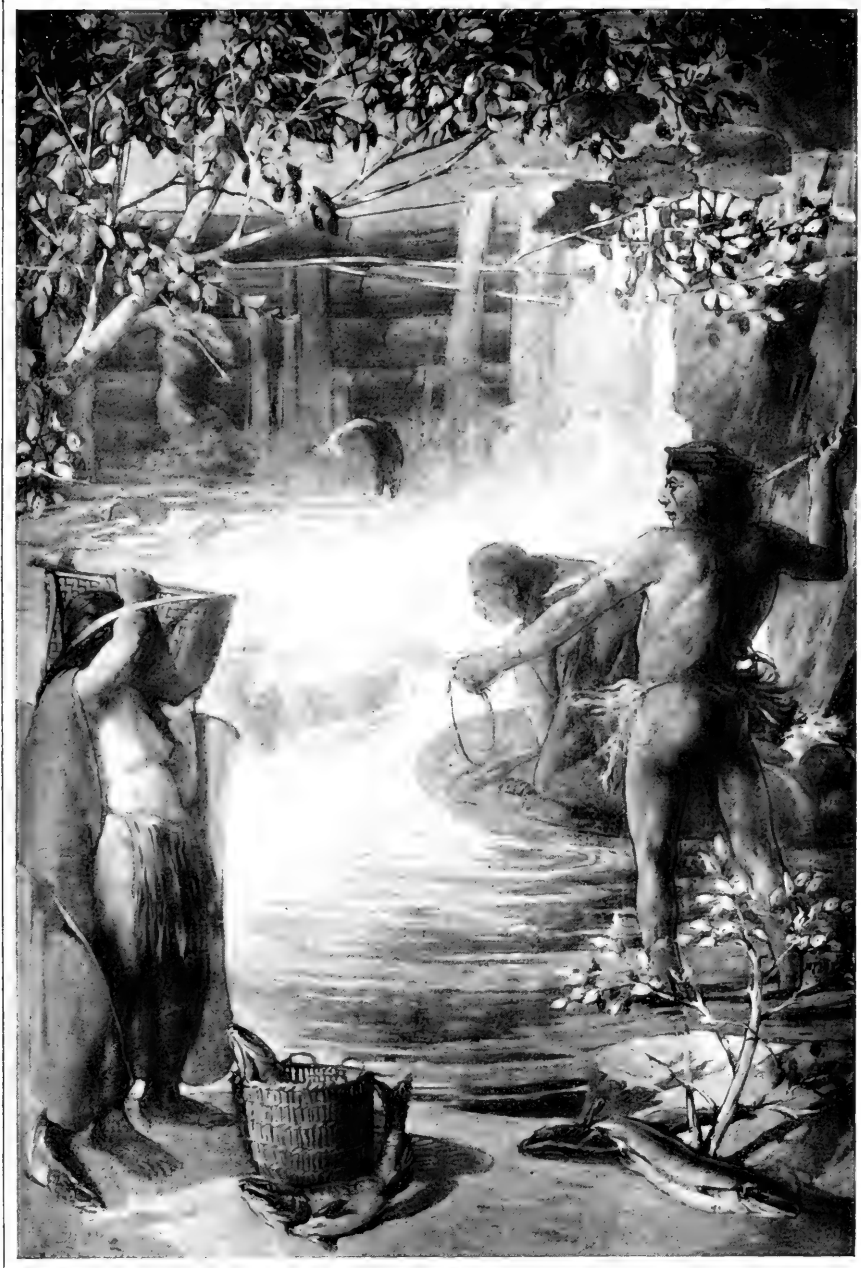
The Indians of the Rio Grande villages have many dances in which important game animals are imitated. This picture shows the deer dance given at the pueblo of Nambé on the annual feast day in 1909



The Lalakonti ceremony, which follows the snake and flute ceremonies of the Hopi, is given by a society of women priestesses. After important ceremonies held in secret during eight days, a public dance is given in the plaza. Basket trays are moved in time with the songs and are afterwards thrown as presents to the spectators



The women who dance in front of the circle shoot with toy bows and arrows at netted hoops. This is supposed to cause the lightning to strike the fields and to result in abundant crops



*Copyright, 1913, by Will S. Taylor*

#### THE SALMON-FISHERS

Mural canvas by Will S. Taylor, from the North Pacific series in the American Museum. The subject is a reconstruction to show the old method of salmon fishing among the Kwakiutl Indians of the Alaskan coast. They built a dam of logs to form a pool in which the migrating salmon were entrapped and speared.

## SHALL INDIAN LORE BE SAVED?

AN IMPERATIVE CALL FOR FIELD WORK BEFORE THE LAST  
OF THE OLD BELIEFS AND OLD CUSTOMS ARE LOST

By George Bird Grinnell

**E**THNOLOGICAL material for the North American continent — especially for the United States — is fast disappearing. It must be gathered soon, or not at all. The longer its collection is postponed the more vague and uncertain will be the results. Our Indians are changing rapidly and to-day the vast majority of the individuals of each tribe have forgotten the old beliefs and the old ways. The pressure of new ideas has driven out the memory of the old things.

It was never true that all the Indians of a tribe, or of a section of a tribe, were well informed on the tribal traditions, beliefs and customs. All the youth had the opportunity to learn, but some children and young people were attentive to what they heard, thoughtful and possessed of good memories; others were heedless, unthinking, forgetful. To-day among the younger Indians — those under forty years of age — there are few who can give any connected account of the old ceremonies, while the detail and ritual of those ceremonies is almost wholly lost.

With the Plains tribes, it is only among the few remaining old men and old women, who reached adult life while the tribes were still wandering free and subsisting on the buffalo, that we find any real knowledge of the tribal history, and of these old people some never knew and others have forgotten. This is evident if one sits by when preparations are being made for some one of the oldtime elaborate ceremonies and listens to the discussions and arguments that take place about the forms to be gone through with. The men of fifty or sixty years of age appeal to those of seventy or eighty for information as to how certain things ought to be done according to the old customs, or ask for the words of certain songs, forgotten by all but a few. These old people, the only ones whose memory still carries so much of the mysterious information of ancient times as has been handed down and remembered, are dying very rapidly and are leaving few or none to take their place. The young men, born since the Indians were brought onto reservations, and obliged to attend schools, neither know nor care for the traditions of their forefathers. Sometimes may be found a middle-aged man who, by temperament or from some condition of his early life, is acquainted with oldtime things, but such men are very unusual. Therefore the springs of our information are rapidly drying up.

Besides that, two obstacles stand in the way of making valuable collections to-day; these obstacles are lack of money and lack of men. Money may be supplied, of course. Men are much harder to find. The reason for this is obvious.

Young men interested in Indians and their lore may conscientiously try

to secure information from the best sources, but being usually unacquainted with Indians and ignorant of their ways of thought, they do not know how to sift the true from the false and often cannot comprehend without elaborate explanations much of what they are told. A wise old man may talk of things that to him were matters of everyday life, but are not in the least understood by the collector. The informant takes for granted in the inquirer a knowledge equal to his own and slurs over, as too familiar to need explanation, a multitude of things about which the inquirer knows nothing.

The present day inquirer is likely to choose as interpreter some educated Indian boy, speaking good English. Such an interpreter is too young to comprehend a narrative dealing with matters that fifty years ago were



Dance house of the Crow Indians at Lodge Grass, Montana, an old Pawnee type of structure used in the hot dance. It has been given a corrugated tin roof and a modern cupola-like superstructure and so illustrates well the passing away of the old things

commonplace. He is also likely to be unacquainted with many of the words used by an old man, for often such old men employ the language of oratory, which to-day is almost obsolete. Yet even if he does not understand the old man's meaning, the interpreter often will not confess this, but will give some interpretation which may be erroneous or obscure. The three persons engaged in the conversation, therefore, are almost certain to misunderstand one another, and the inquirer is likely to bring back material which may be wholly misleading.

For the most part, the Indian young men of the present day do not understand why anyone should wish to set down, and as far as may be explain, all that can be learned about the old ways of their people. They regard the inquisitiveness about these things, which some white people show, as one of the eccentricities of that race, hardly susceptible of explanation, but from which if possible a profit should be derived. I have been

told of cases, in two widely separated and unrelated tribes, where young men learning of the arrival of an inquirer, have come together and invented strange and mysterious stories which, for a price, they related as being of the tribal traditions. This is said to have happened only a few years ago, and the stories told were accepted in perfect good faith.

Some years ago the American Museum of Natural History chose the best possible sort of an investigator when it selected David Duvall, a young Blackfoot Indian deeply interested in the history of his people, and engaged him to collect and sift material concerning them, which was later turned over to an ethnologist. Unfortunately Duvall died in the summer of 1911, but it is quite within the bounds of possibility that on other reservations other men of his type may be found and may be induced to do good and honest work such as he did.

It is greatly to be wished that funds available to push this work be found without delay. So far as the Plains tribes go, I know of nothing more important.

If the acquisition of real knowledge about our aboriginal population is necessary for the Plains — with which I have long been chiefly concerned — no less is it necessary for the whole of North America. That a vast deal of work remains to be done in the Southwest, and a vast deal in the North and Northwest. The remarkable discoveries reported by Stefánsson are suggestive of what we may still hope to learn, provided the right persons take hold of the work in the right way.

Long as I have been associated with certain tribes of Plains Indians I am continually discovering new facts of interest; facts that shed fresh light on the ways of thought and ancient habits of these people.

Our knowledge of most tribes still remains only superficial. Almost every article that gets into print, about those Indians that I know best, shows that in many respects they are misunderstood and that statements are being made about them which the facts do not warrant. If this is true of the people that I know about, who can doubt that it is true also of other tribes about which I know nothing? The situation is one of great difficulty.

One may be pardoned for not accepting with absolute confidence the material brought back by the average young collector of to-day, who however hard he may work and however sincere his interest may be, cannot in the nature of things come — in the course of a few weeks or months or even years — to understand one so different from himself in viewpoint and experience as is the stone-age man with whom he speaks.

I sometimes wonder what the reader of a hundred years hence will believe about the North American Indians. It is quite certain that while in what has been written about them he will find much that is true, he will also find many false statements together with a vast number of theories and conclusions not justified by facts.



SITE ON THE RED DEER RIVER WHERE THE CRESTED DINOSAUR WAS FOUND

Looking down the river from the prairie level at Tolman Ferry near which was found the skeleton of the *Saurolophus*



# A NEW CRESTED DINOSAUR

By Barnum Brown

With photographs by the Author

THE most recent acquisition in the dinosaur hall is the skeleton of a new dinosaur found by the Museum expedition to Alberta in 1911. This specimen is exhibited as a vertical panel mount, the bones still partly buried in the original rock from which they have been chiseled in relief and for the most part in the position as found excepting that the skeleton was lying horizontal on its right side.

When the dinosaur was found, ripple-marked sandstone surrounded the skull and a part of the skeleton. These ripples in which are seen worm tracks and impressions of horsetails or scouring rushes (*Equisetum*) have been continued above the skeleton as though the body had been washed in near shore making a dam in the shallow water, and the shoreward side of the beach had dried up forming mud cracks.

The skeleton with pieces of skin clinging to it here and there was evidently buried on a sandy beach with comparatively little disturbance of the bones. Millions of years passed, the bones turned to stone and hundreds of feet of earth accumulated above them as the low-lying coastal marshes were filled in while the climate then subtropical changed to temperate cold. Finally the Red Deer River, a comparatively recent watercourse, began to cut through these sediments, uncovering fossil treasures



Professor Henry F. Osborn and party in canoe leaving the fossil camp near Tolman, Alberta, for a 150-mile trip down the river to the Belly River Cretaceous beds

of the Cretaceous age. Recently in the side of the cañon five hundred feet below the prairie surface, a few bones were discovered protruding from the rocks which proved to be the spines of vertebræ and the skull of a nearly complete skeleton.

This skeleton presents characters strikingly distinct from related forms and it has been made the type of a new genus *Saurolophus* (meaning "crested



The *Saurolophus* skeleton in the quarry, earth and surplus stone removed but not yet plastered. It lay on the right side with skull still surrounded by ripple-marked sandstone [near the observer]; the tail extending beyond the man's hand; feet and hind limbs nearer the bank. The ribs on the upper side had been washed away during fossilization

saurian") which is closely related to the well-known duck-bill *Trachodon*. The new dinosaur is distinguished by a great bony crest on the back of the skull which in life evidently supported a leathery lobe of skin similar to the living lizard *Basiliscus*. Other distinctive characters are found in the hip bones, the ischium of which resembles in general structure that of the



CRESTED DINOSAUR SKELETON EXHIBITED AS A PANEL MOUNT  
Dinosaur Hall, American Museum of Natural History



#### EXCAVATION OF DINOSAUR SKELETON

This skeleton was found near Steveville, Alberta. The point of the tail which had weathered out gave a clue to the location



DINOSAUR SKELETON NEAR STEVEVILLE, ALBERTA

This skeleton, excavated in the Belly River beds in 1912 and not yet prepared for exhibition, is complete except the point of the tail; the bones are little crushed and underneath, the impression of the epidermis is preserved and apparently the entire skin on the left side of the body

carnivorous dinosaurs and supported great caudo-abdominal muscles. In life this animal was about thirty-two feet in length and stood between fifteen and seventeen feet in height when erect. These measurements refer to the skeleton only and do not include the erectal skin portion of the crest which probably added considerable to the height during excitement when the dinosaur must have been a most imposing creature.

Like *Trachodon* it was an herb-eater and without means of defense from the contemporary flesh-eating *Albertosaurus* except in its power of swimming away from danger. Great numbers of these creatures lived in the pre-historic coastal marshes. In a single quarry — and there are many such quarries on the Red Deer River — bones of several hundred individuals mostly of this kind have been washed out of the bank.

The expedition to Alberta last summer secured a carload of fossils several of which are new to science. One of the prize specimens is an unusually complete skeleton of another new dinosaur coming from an older formation and probably ancestral to *Saurolophus*. In this new skeleton the skin impression is preserved more or less completely on one side. When prepared it will be exhibited as a double-faced panel, one side showing the skin, the opposite side showing the bones and their muscle attachments.



Quarry below Tolman where in 1912 a complete pelvis of *Ankylosaurus* was found. Lowering a 700-pound box with block and fall to the valley one hundred feet below

## BIRD-BANDING IN AMERICA

[*"Return records" quoted from a report by Mr. Howard H. Cleaves, of the American Bird-Banding Association,<sup>1</sup> before the American Ornithologists' Union*]

IT WAS on June 7, 1911, that an adult chimney swift fluttered down a chimney into the study of Mr. Ernest Harold Baynes in Meriden, New Hampshire, and was promptly banded and released. The band bore the number 6326. At eight o'clock p. m. on June 15, 1912, two chimney swifts flew from the chimney into the same room where the bird had been caught a year and eight days before. When these birds were taken in hand and examined one of them proved to be 6326. Remarkable as it may seem this diminutive creature less than six inches in length, had traveled hundreds of miles to Central America or elsewhere in the tropics where he spent the winter and then had made the long return journey at the approach of summer and found again the chimney of his choice in a village of far-off New Hampshire. And throughout his journeyings the little aluminum ring had traveled with him.

Two French Canadians were gunning along a small river near the hamlet of Whitebread in southwestern Ontario, Canada, on August 5, 1912. Black-birds, their intended booty, were not numerous and the men were about to return to camp when one suddenly touched the other on the arm and said pointing to a flying tern, "You cannot hit him!" In answer to this challenge the second gunner wheeled quickly about and took a difficult chance

<sup>1</sup> The American Bird-Banding Association, but recently organized, is planned on the lines of the many European bird-banding associations of long standing and large results. It has its headquarters at the American Museum and is thoroughly in sympathy with the conservative work of the bird lovers of the country, its membership including not only the foremost members of the American Ornithologists' Union but also leaders of the great Audubon movement.

The aim of the work is purely scientific, the extension of knowledge of bird habits by means of records made by men who are enthusiastic bird students and accurate observers. Each wild bird banded wears an aluminum ring that slips loosely up and down the tarsus so as to be of no injury or inconvenience to the bird. The ring bears the words, "Notify American Museum, New York," and corresponds to a card in the filed records of the Museum giving the species of the bird, and also the date, place and circumstances of banding. The following questions quoted from the association's pamphlet of directions suggest some of the results hoped for:

1. To what extent do birds return year after year to their previous nesting place?
2. How far from their birthplace will birds be found nesting?
3. In cases where an identical nest is occupied in successive seasons, how is the tenancy determined?
4. Do birds reared in distinctive nesting sites themselves favor a similar site?
5. In migration, how far and in what direction do individual birds travel?
6. Do migrants travel by definite routes, and if so, what is the nature of these routes?
7. Do birds have definite winter quarters which they seek each year?
8. To what extent are males and females, young and old, separated while migrating and in winter quarters?
9. What relation do the winter quarters of the northerly-breeding members of a species bear to those of the southerly-breeding members?
10. To what age do wild birds live?



Banding black-backed gulls at Lake George, Yarmouth County, Nova Scotia

question had been marked when about two weeks old at Saint Clair Flats Canal, Michigan on August 13, 1909, by Mr. S. A. Courtis. By correspondence with Mr. Salois it was learned that the terns were apparently not nesting at Whitebread, Ontario, and it is not unlikely that the birds seen there had bred at Saint Clair Flats and were indulging in a little roving after the nesting season. However this may be, the facts remain that the dead tern had worn the aluminum anklet for three years minus eight days; had likely made three round trips to the Gulf of Mexico or some other place in the tropics to

shot at the fast disappearing bird. There were many terns flying up and down the stream, hovering in the air and plunging for minnows, and it seems strange that the one shot should have born a band on its leg with the number 4590. The finding of that band resulted in a letter to New York from the gunner, Mr. Leo Salois. On referring to 4590 among the original banding records it was found that the bird in



Young black-backed gull wearing aluminum ring which bears the inscription, "Notify American Museum, New York".

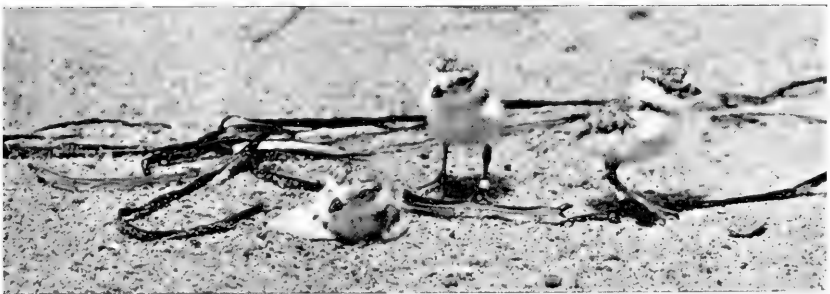


spend the winter each year since 1909; and when shot was within about thirty-five miles of the spot where it was hatched.

A farmer by the name of August Schilling of Evansville, Illinois, was walking across his fields on April 1, 1912, when he frightened a butcher bird from a fencepost where it had been feeding on what proved to be a bluebird. On picking up the victim and scrutinizing it, Mr. Schilling was astonished to discover that the bird wore a ring on its right leg, and that the ring bore an inscription. He wrote a letter giving the number of the band and asked for information saying, "Please let me know when the band was put on. There are lots of people who would like to know."

This particular bluebird was one of a brood banded by Dr. R. M. Strong of the University of Chicago at West Allis, Wisconsin on July 5, 1909. The band had been carried for two years and nine months and had apparently caused no inconvenience. It is probable that this bluebird had made two complete migrations to the south and was about to complete the last lap of a third when he was so unfortunate as to cross the path of *Lanius borealis*.

Beyond a doubt the year just past [1912] has seen the greatest progress in the work of banding birds in America. All told during the twelve months, eight hundred bands have been placed on birds and some of them have already yielded return records possessing a high degree of interest. The total number of species banded during the past summer is seventy-three, a few of the more unusual being black guillemot, great black-backed gull, least tern, glossy ibis, American egret, barn owl, short-eared owl, chestnut-collared longspur and dickcissel. It is only by extensive banding through a long period of time that results of value will be obtained. It cannot be wise to spring at conclusions with regard to the significance of return records. The fact that Mr. Baynes's chimney swift returned to its old stand after an absence of nearly a year in the tropics is insignificant as proof in itself. Before stating that chimney swifts invariably return year after year to the same chimney, it would be advisable, not to say necessary, to obtain many similar records as corroborative evidence.



Young piping plovers three days old banded on Martha's Vineyard, July 3, 1912. One was shot August 2 not far from the home site. As Massachusetts laws protect piping plovers at all seasons, this return record started an investigation of value

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Life Members*, MRS. RICHARD MARCH HOE, MISS ELEANOR DEGRAFF CUYLER and DR. ALLEN M. THOMAS;

*Sustaining Members*, MRS. ALFRED M. COATS, MISS MARIE L. RUSSELL, and MESSRS. BENJAMIN A. HEGEMAN, JR., ARTHUR NOTMAN and OGDEN M. REID;

*Annual Members*, MRS. M. J. BLUEN, MRS. IRVING BROKAW, MRS. STARLING W. CHILDS, MRS. JEFFERSON CODDINGTON, MRS. A. B. FRANK, MRS. WILLIAM SAMUEL HAWK, MRS. ADOLF S. LADENBURG, MRS. HENRY J. LAMARCHE, MRS. R. A. DELIMA MAYER, MRS. TITUS B. MEIGS, MRS. U. H. PAINTER, MRS. L. A. PFLETSCHINGER, MRS. W. S. RAINSFORD, MRS. JOHN SINCLAIR, MRS. FRANCIS H. SLADE, MRS. H. B. WIGHT, MISS LOUISA LOW, MISS ELIZABETH M. SHARPE, MISS GEORGINA SCHUYLER, HON. EDGAR J. LAUER, DR. AMOS CANFIELD, DR. JOHN E. WEEKS and MESSRS. PERCY H. ASHMEAD, T. ARTHUR BALL, ALVIN V. BAIRD, CHARLES BAIRD, MAX S. BOEHM, THEODORE BOETTGER, RICHARD C. BONDY, WILLIAM BONDY, CHARLES P. BONNETT, ENOS S. BOOTH, J. W. C. CAMPBELL, JOSÉ E. CHAVES, GEORGE U. CLAUSEN, JOHN CLERICI, WILLIAM H. CROCKER, DEWITT A. DAVIDSON, LEONARD M. DAVIS, ARTHUR R. DENMAN, WILLIAM A. DOBBYN, FRANCIS P. DODGE, WALTER DOUGLAS, HENRY E. DUNN, EDMUND ECKART, RICHARD EDIE, JR., BENNO ELKAN, WILLIAM ERDMANN, JAMES C. FENHAGEN, LOCKWOOD DEFORREST, JULIUS FRANKE, WILLIAM S. FRIEDLANDER, WILLIAM K. GILLET, HENRY GLEASON, JAMES A. GOLDSMITH, WILLIAM GOTTGRETREU, AUSTIN M. GREER, ANTHONY GREF, ALFRED C. GREENING, C. W. HAMMILL, GEORGE B. HERZIG, HENRY R. HILLARD, W. J. HOGGSON, B. H. HOMAN, LEO M. KLEIN, JOHN G. LUKE, LEA SHIPPEN LUQUER, SAMUEL McROBERTS, MELVILLE D. MARTIN, T. ANSON MATTHEWS, MORTON H. MEINHARD, S. STAMWOOD MENKEN, BARRINGTON MOORE, JOHN NICOLSON, RUTLEDGE IRVING ODELL, A. G. PAINE, JR., MILTON C. PALMER, G. ELTON PARKS, L. O. PECK, GEORGE H. PERKINS, CHARLES W. PLACE, OTTO EUGENE REIMER, CHARLES W. RENDIGS, GEORGE C. RIGGS, WALTER CLARK RUNYON, ACKLEY C. SCHUYLER, CHARLES O. SCULL, FRANK SEAMEN, MYLES STANDISH SLOCUM, F. L. STALLMAN, J. CRAWFORD STEVENS, PERCY S. STRAUS, MOSES TANENBAUM, RICHARD E. THIBAUT, JOSEPH B. THOMAS, KARL H. VESPER, H. D. WALBRIDGE, ALLEN WARDWELL, ARTHUR L. WESSELL, WALTER K. WILDES and FRANCIS A. WILSON.

PREPARATIONS for the Crocker Land expedition are progressing satisfactorily. The University of Illinois has made an appropriation which provides for the addition of a trained zoölogist to the expedition party, and Dr. M. C. Tanquary, a graduate of the University, has been appointed to the post. The General Electric Company has offered to contribute a thoroughly up-to-date outfit for power for wireless telegraphy and electric lighting, heating and cooking; the American Geographical Society has added three thousand dollars to its previous subscription of six thousand; Mr. Zenas Crane has increased his subscription by an additional twenty-five hundred dollars; Mr. George B. French has added one thousand to the fund and Colonel D. L. Brainard has contributed one hundred dollars. The United States Navy Department has added the detail of a skilled electrician and wireless operator to its previous detail of Ensign Fitzhugh Green to the cartographic and magnetic work of the expedition; the United States Hydrographic Office and Naval Observatory are

lending a number of surveying and other instruments; and the Department of Agriculture through the Weather Bureau is providing a full equipment for the establishment of a meteorological station at the permanent headquarters on Bache Peninsula. The Bureau of Terrestrial Magnetism of the Carnegie Institution is to supply the instruments required for making and recording the magnetic observations. The Georgetown University, Washington, D. C., is loaning the party a Wiechert seismograph for the establishment of a station at the home headquarters on Flagler Bay, which is to be under the care of Mr. Green. Other assistance in the way of money and equipment is promised.

DR. E. O. HOVEY, curator of geology and invertebrate palæontology has devoted about six weeks to a trip to Panama and Costa Rica in the interests of the Museum. Specimens giving a fairly complete section from the Atlantic to the Pacific across the Isthmus and illustrative series from the volcano of Poas and the gold district of Aguacate, Costa Rica, were secured together with many photographs. The Isthmian Canal Commission has presented to the Museum a selected series of most excellent photographs of the Panama Canal and the Zone.

THE friendly coöperation between this Museum and the great natural history museum at Frankfurt (Senckenberg Museum) has been shown in the past by exchanges from one to the other institution of fine exhibition specimens of fossils. The latest are the skeletons of *Phenacodus* and *Sinopa*, duplicates of those in our Tertiary mammal hall, purchased by the Frankfurt museum and restored after the more perfect originals in our collection by members of our preparation staff. These are important types of the early Tertiary faunæ, representing the primitive hooved and clawed animals respectively. The *Phenacodus* has already been handsomely installed in a prominent position in the galleries of the Senckenberg Museum.

PROFESSOR GEORGE GRANT MACCURDY of Yale University spent a few days at the Museum recently cataloguing the collection of palæolithic implements he secured for the Museum on his last trip to Europe.

MR. FRANCIS LA FLESCHÉ, an educated Omaha Indian from Washington, D. C., visited the Museum in March. He is now occupied with an anthropological investigation of the Osage Indians of Oklahoma under the direction of the United States National Museum. These Indians speak a Siouan language and are noted for the great number of medicine bundles to be found among them.

REV. GILBERT L. WILSON of Minneapolis has just filed the report of his investigation of the agricultural customs of the Mandan and Hidatsa Indians. This promises to be one of the most complete and suggestive studies of this particular phase of American Indian culture. It brings out among other things the aboriginal origin of methods of fertilization and propagation. Certain fields were not only the habitual planting places of particular families, but the right to them was hereditary. This is important because it approaches the modern conception of individual ownership of land, a rarity among the communal Indian tribes. A series of primitive agricultural implements from this tribe is on exhibition in the Plains Indian hall.

THE great collection of dinosaurs secured in western Canada last year keeps busy most of the staff of preparators of the department of vertebrate palæontology. Several fine specimens are well-nigh completely cleaned up and can be placed on

exhibition this summer; others will take a year before they are ready for exhibition. Although related to the dinosaurs of Montana and Wyoming, most of these are new kinds or have been known hitherto by very fragmentary specimens.

Two skeletons of the little Eocene lemuroid *Notharctus* are being restored for a group mount. They are related to the living lemurs of Madagascar and were very like them in size and appearance. But living near the beginning in the Age of Mammals they are regarded as collateral ancestors of the higher Primates (monkeys, apes and man) which first appeared much later in time. These skeletons were found in Wyoming where they were contemporary with the four-toed horses.

THE collections of rare Eocene mammals made by Mr. Walter Granger last summer are being catalogued and prepared. They include numerous new species and a number of new genera of scientific interest besides additional or better specimens of those hitherto known. The collection is of great value for scientific research and a preliminary account of the new material will shortly be published in the *Museum Bulletin*.

MR. JAMES BARNES of New York and Mr. Cherry Kearton of London are planning to cross Central Africa for the purpose of making photographs of the animal life. This expedition has the indorsement of the American Museum.

A LARGE collection from the Malecite Indians has just been placed on view in the Eastern Woodlands hall under the section devoted to the Eastern Algonkin tribes of New England and Eastern Canada. The collection was made during the winter by G. A. Paul, the hereditary chief of the Penobscot Indians.

MR. N. C. NELSON, assistant curator in anthropology, will soon go to Europe to study the results and methods of archaeologists. He will visit the principal caverns and other sites where the remains of palæolithic cultures have been found and gather material and data for a type model of such deposits.

MR. ROY F. LEIGHTON, a student of anatomy in the University of Vermont, is making a special study of the Museum's large collection of trephined skulls from South America.

IN one of the side alcoves of the Southwest hall is a small model of the proposed Hopi village group prepared by Mr. Howard McCormick and Mr. Mahonri M. Young. The group as designed will show by panoramic background, a view of the Pueblo of Walpi and its surroundings, while in the foreground will be a life-size family group as seen upon the terrace of a house in another village. The plan is to make this as accurate and artistic as the bird habitat groups. When one recalls that everywhere Indian life is fast passing away, the need of a few such groups is clear. With the extinction of the last elements of Indian culture will go out from our midst one of the most original of the world's artistic elements.

MR. ISRAEL KLIGLER has been made assistant in the department of public health, the appointment to date from April 1.

THREE fish exhibition groups which have been in preparation for some time, are now completed. They represent three of the ganoid fishes peculiar to North America. One group shows the nesting habits of the bowfin (*Amia calva*), a fish widely distri-

buted in the Mississippi Valley and the Eastern States, and interesting as the only survivor of a very ancient family of fishes once widely distributed in the northern hemisphere. The second group represents the shovel-nose sturgeon (*Scaphirhynchus platyrhynchus*), a fish of considerable commercial value both for its flesh, which is "sturgeon," and the roe, which is made into caviar. A school of these fish is represented in the group, swimming, as is their wont, near the sandy bottom in search of food. The third group represents spawning fish, nest and eggs of the long-nosed gar pike (*Lepidosteus osseus*). These groups were planned by Professor Bashford Dean. The studies for them, made possible through the Cleveland H. Dodge fund, were carried out by Mr. Dwight Franklin in the spring of 1912 in Wisconsin.

THE collections in the hall of North American archaeology have been readjusted to occupy the new wall cases and to make room for the expansion of the European exhibit. The mural series of palæolithic cavern paintings has been completed and will soon be open to the public.

MR. DANIEL MOORE FISK has recently been appointed assistant in the department of invertebrate zoölogy. Mr. Fisk is a graduate of Columbia University.

A buffalo-hide shield and a war shirt have been added to the historical exhibit in the Plains Indian hall. These were taken from the body of an Indian by Alfred Rochefort Calhoun after an engagement in 1868. The tribe cannot be certainly determined but judging from the shield, the owner was a Cheyenne. This historical section now contains two scalps, objects owned by the famous Sitting-bull, and also a personal medicine bag from the equally distinguished Red-cloud. Among the older pieces are a war shirt and two feather headdresses collected by Colonel Sword in 1838.

A delegation of Indians mostly from the Plains area, who had attended the breaking of the ground for the new monument to the American Indian at Fort Wadsworth, came to the Museum recently and were received by members of the department of anthropology. The most distinguished members of the Crow delegation among the visitors were Plenty-coups and Medicine-crow. Both rank as chiefs by the old Indian way of reckoning according to martial deeds, and Plenty-coups has the additional prestige of being recognized as tribal chief by the United States government. Medicine-crow not only enjoys an unusual record for warlike achievement but is also famous for his ceremonial activity. He is the owner of a medicine-pipe bundle and has founded a new branch of the Tobacco order, the greatest of Crow ceremonial organizations. Another of the visitors, White-man-runs-him, has the distinction of being one of the surviving Custer scouts.

DR. J. A. ALLEN represented the American Museum at the meeting of the International Zoölogical Congress at Monaco. Some of the important work of the Congress was done by the International Commission on Nomenclature. Meetings were held for ten days both morning and afternoon, for five days by the Commission and later by a section of the Congress, during which an attempt to break down the law of priority was met and handled in such a way that in the end the authority of the International Commission was strengthened and the outlook for harmony on questions of nomenclature improved. From Monaco Dr. Allen goes to London for comparative work at the British Museum on mammals from South America and Africa.

THE Council of the American Anthropological Association under the chairmanship of Professor Alexander F. Chamberlain of Clark University, met recently at the American Museum of Natural History. In an informal discussion Professor R. S. Woodworth of Columbia University gave a report on the psychological investigation of primitive races, which was followed by remarks on methods of research in physical anthropology, archæology, art, linguistics, and technology. Among those who took part in the discussion were Professor Chamberlain, Mr. Frederick W. Hodge, the ethnologist-in-charge of the Bureau of American Ethnology, Professor Franz Boas of Columbia, Professor Alfred M. Tozzer of Harvard, Drs. Clark Wissler, Pliny E. Goddard, and Robert H. Lowie. In honor of the non-resident anthropologists attending the council session, the American Ethnological Society gave an informal dinner at the Hotel Endicott, after which all returned to the Museum for the regular monthly meeting of the local society. At the evening session Mr. N. C. Nelson spoke on the Galisteo Pueblos, while Dr. Herbert J. Spinden and Mr. Alanson Skinner discussed the folklore of the Tewa and Menomini Indians respectively.

At the March meeting of the Section of Biology, New York Academy of Sciences, Mr. George G. Scott of the College of the City of New York, summarized his own and other investigations on osmotic pressure of the tissues in aquatic animals. In marine invertebrates the internal osmotic pressure varies with that of the external medium; in the higher fishes it is more stable, responses to changes in the medium being limited in range; in the lower fishes (sharks) intermediate conditions are observed. Discussion of Mr. Scott's communication brought out the principle that osmotic phenomena had played an important rôle in evolution, especially of the respiratory organs, circulatory system and skin of vertebrates.

THE hall of public health in the American Museum will be opened April 16, the event marked by a public meeting in the interest of the campaign for civic cleanliness instituted by the New York City department of health. Addresses illustrated with moving pictures, will be given by Dr. Ernest J. Lederle, Mrs. Edward R. Hewitt and Prof. C-E. A. Winslow. At a reception following, there will be exhibited an enlarged model of the house fly prepared at the Museum during the past year and models of other specimens dealing with the relation of insects to the dissemination of disease.

THE MUSEUM will this summer have three field parties in search of fossil vertebrates, continuing the systematic exploration of regions which last summer and in previous years have yielded very important additions to our collections. Mr. Barnum Brown will continue work on the Cretaceous of Alberta, Mr. Walter Granger in the Eocene of New Mexico and Wyoming, Mr. Albert Thomson in the Miocene of Nebraska. While it is not expected that the unusual success of last summer will be duplicated, we look forward to securing valuable specimens of Cretaceous dinosaurs and Eocene and Miocene mammals.

MR. RUSSELL J. COLES of Danville, Virginia, has presented to the Museum many interesting specimens of fishes from the coast of North Carolina, notably sharks and rays. His intimate acquaintance with the Cape Lookout region enables him to navigate its treacherous waters in a small sailboat and thus gain first-hand knowledge of little-known species. During the coming season Mr. Coles will continue to collect for the Museum and among other specimens hopes to capture a porpoise of doubtful identity previously observed in the region.

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NUMBER 4

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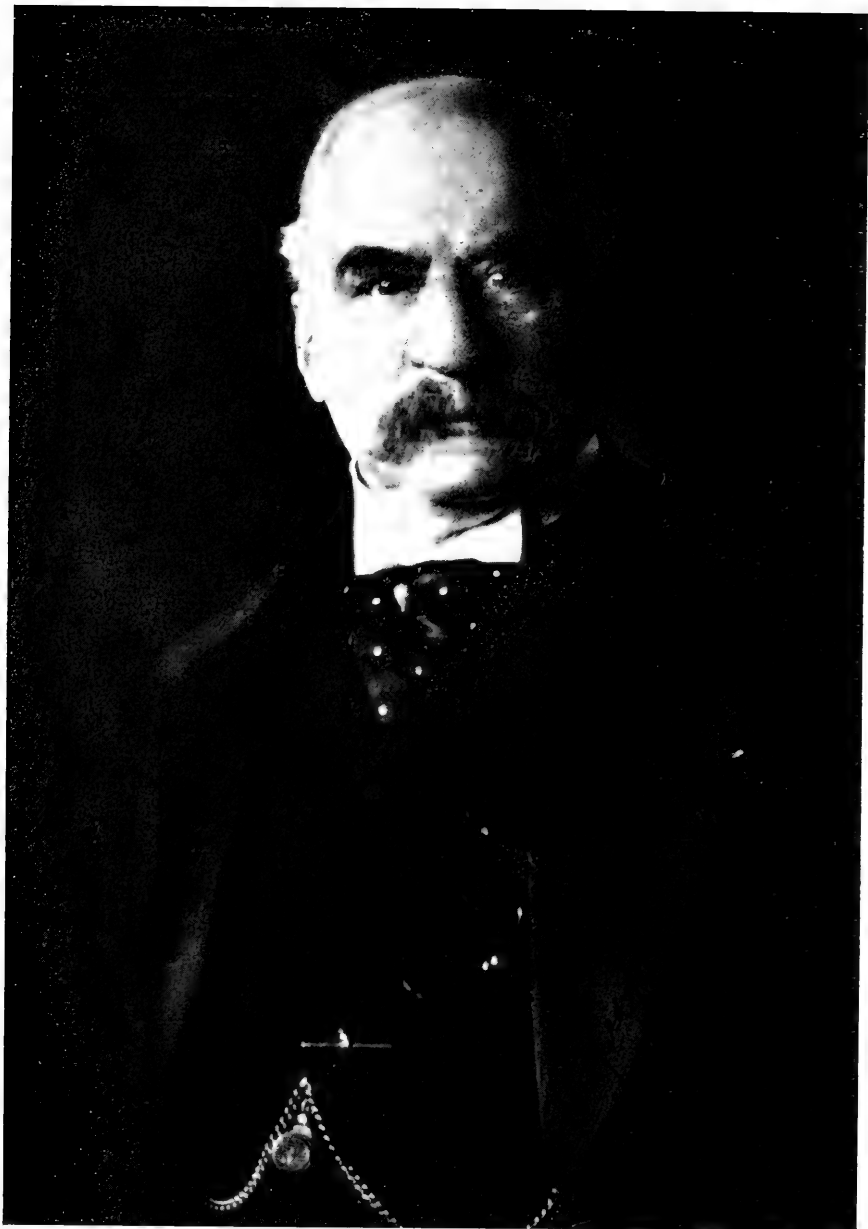
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MARY CYNTHIA DICKERSON, *Editor*

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**The Journal is sent free to all members of the Museum.**



J. PIERPONT MORGAN

1837-1913

One of the founders of the American Museum of Natural History. Member of the finance committee of the Board of Trustees, 1873-1910. Treasurer, 1875-1890. First vice-president, 1903-1910. Mr. Morgan was also one of the institution's most generous benefactors



# The American Museum Journal

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## J. PIERPONT MORGAN

A FOUNDER AND BENEFACTOR OF THE MUSEUM

By Joseph H. Choate

THE death of J. Pierpont Morgan is a very severe loss to the American Museum of Natural History. As one of the charter founders of the Museum, as a trustee from the beginning, and for a long period a vice-president and a member of the Executive Committee, he exercised always a commanding influence in its councils, and as one of its most generous benefactors, he contributed largely to the enrichment of its collections.

To the long continued efforts of Morris K. Jesup and of Henry Fairfield Osborn to maintain the Museum in a leading place among the museums of natural history in the world, and at the same time to make it a powerful educational influence in the City of New York, he gave continual support. The very rich and almost unique collection of gems and minerals which he presented to the Museum is in itself an object of vast interest and admiration in the scientific world, as well as in the popular mind, and is a delightful monument to his memory. And then, besides the material wealth which he has donated so freely to the Museum, the mere fact of his having been a member of its Board of Trustees and an active worker in its affairs for more than forty years, is an invaluable possession.

As Mr. Morgan himself said in his examination at Washington, "character is the secret of all success in life," and this applies as well to corporate as to individual success, and especially to corporations organized not for money-making or business purposes, but for the promotion, in any form, of the public welfare; and when an institution like the American Museum of Natural History aspires, as it did from the beginning, to take a great place not only in the public eye but also in the scientific and educational world, the presence of such an individual in its government invites and holds for it at all times universal approval. It was sufficient to say that Mr. Morgan was one of its active officers and workers to answer all queries about it.

To his associates in the Board, and to the scientific staff and large company of employees, who regarded a visit of his to the Museum as an important event, he had long since become a figure of great personal interest which commanded their general respect and affection. His influence was always for good, and for conduct and measures on the part of the Museum, of an elevated and inspiring character. The same qualities that gave him his supreme place among his fellow citizens in the United States and attracted the admiration of all the people in the world who knew him, if even only by name, made him always an invaluable element in the cause of education and science represented by the American Museum.



*By courtesy of the  
Century Club*

J. PIERPONT MORGAN

Photograph taken at about the time of the founding of the American Museum

# THE GIFTS OF MR. MORGAN TO THE AMERICAN MUSEUM

WITH AN EXPRESSION OF GRATITUDE AND INDEBTEDNESS BY  
THE BOARD OF TRUSTEES

By Henry Fairfield Osborn

**A**T the age of thirty-one J. Pierpont Morgan had won such a position in New York that as one of the leading citizens of the city he was included among the founders of the American Museum. From the first he took an active part, joining Joseph H. Choate and Andrew H. Green in preparing the laws of the institution and William T. Blodgett and Theodore Roosevelt in securing legislation to provide for the erection of a building. After rendering these initial services, as early as 1871 he united with Morris K. Jesup and others to mature plans to increase the funds of the Museum; he served as a member of the finance committee from 1873 to 1910, as treasurer from 1875 to 1890, and as first vice-president from 1903 until 1910. He was the chief supporter of Mr. Jesup's great administration, and was second only to Mr. Jesup as the most generous benefactor of the Museum. His interest was not centered in any one department, but extended to the Museum as a whole, as manifested by his munificent contributions of \$25,000 to the endowment in 1890 and of \$300,000 in 1904.

The trustees of the Museum desiring to express the gratitude of the institution for this noble life work, adopted the following resolution at a special meeting of the board on April 4:

The people of New York and of this country are forever indebted to

**John Pierpont Morgan**

for his large share in the foundation and the upbuilding of

**The American Museum of Natural History**

as a national institution of education and of public welfare.

From December 30, 1868, when the first steps were taken to found the Museum, until 1912, when he last visited his collections of minerals and gems in the Museum, he gave munificently of his time, his judgment, his affection, his means. In this, as in so many other public causes, he will be remembered as a true patriot and loyal citizen of the republic.

He served as charter member of the museum corporation, as treasurer, as chairman of the Finance Committee, as first vice-president. His gifts to the exhibition halls and to the endowment have enriched every branch of the Museum, and are of such a rare and beautiful character as to give an inspiration and love of nature for all time.

His love of the beautiful led Mr. Morgan to take special interest in the collections of minerals and gems. It is probable that he himself kept no record of the whole number of his gifts, for he gave out of love for the institution and the pleasure of giving. It is interesting therefore, to enumerate for the first time some of his chief donations which have been brought together in the long record of forty-four years since the Museum was founded:

Collection of gems and precious stones  
 Bement collection of minerals  
 Bement collection of meteorites  
 The John Collins Warren collection, including the Warren  
 Mastodon  
 Charles R. Knight's restorations of fossil vertebrates  
 Lenders collection of Indian costumes  
 Contribution to the third African expedition  
 Garces archæological collection from Lake Titicaca  
 Contributions to the endowment  
 Contributions to the capital and maintenance fund  
 Mummy of the Chilean miner  
 Great boulder of jade from New Zealand

It was through Mr. Morgan that the Museum came into possession of the unique series of restorations of extinct animals executed by Charles R. Knight, reproductions of which have found their way into most of the natural history museums of the Old World.

The Garces collection received from him comes from prehistoric sites on the islands of Lake Titicaca, Peru, and Copacabana, Bolivia, numbering about five hundred objects in gold, silver, copper and bronze, of beautiful design.

The Lenders Plains Indian collection numbers more than twelve hundred pieces and contains many old and rare examples of Indian costumes, beads and quill work, shields, ornamented pipes and weapons.

One of his most unique gifts is that of the ancient pre-Columbian miner, known as the Chilean mummy, wonderfully preserved through the tissues being impregnated with copper salts.

On the occasion of his last visit to the Museum Mr. Morgan was delighted with the rearrangement of the mineral collection in the great south hall, and his very last gift to the Museum, a few months before his death, was an especially exquisite collection of precious and semiprecious stones.

It seems appropriate to the committee of the trustees appointed to memorialize the great services of Mr. Morgan to the Museum to place an artistic memorial of the donor in the halls which will always be especially associated with his name, and to perpetuate his memory still further by naming these halls "the Morgan Halls."

# THE MORGAN COLLECTION OF PRECIOUS STONES

By George Frederick Kunz

OF all the many and munificent gifts with which our great and lamented fellow citizen, John Pierpont Morgan, enriched the collections of our museums, none has afforded more instruction to a large number of visitors or is more highly appreciated and better known than the wonderful Morgan gem collection exhibited on the upper floor of the southern wing of the American Museum of Natural History, on the Seventy-seventh Street side.

We can truly say also that none of Mr. Morgan's gifts gave him more pleasure, and his interest in the collection was as keen the last time I spoke to him as it had been at the outset. That one so familiar with the best in all branches of art should be a lover of beauty of form and color goes without saying, and we may add that his thorough appreciation and understanding of the finest examples made him a severe critic in such matters, rendering him intolerant of everything mediocre, commonplace or uninteresting. And he possessed withal a wonderfully retentive memory of what he knew was in the collection or of what he had seen, which only enhanced his admiration of what was exceptionally fine.

Until 1882 scarcely any attention was paid to precious stones in the United States. A few years before that date I had seriously taken up the subject of studying and collecting gems, and had prevailed upon Messrs. Tiffany and Company to preserve the best examples that presented themselves to form the collection which was exhibited in a circular pavilion at the Paris Exposition of 1889, in the center of the American section.

At the solicitation of the late Morris K. Jesup, president of the American Museum of Natural History, Mr. Morgan presented this entire collection to the Museum. The specimens were displayed in two long cases on the upper floor, and some five years later the fact that the tile pavement on both sides had been worn to a considerable depth along the line where the cases stood, gave testimony to the interest excited in the general public.

The success of the first collection led me to believe that a collection of precious stones of other than American origin would be worthy of a greater national exhibition, and a consultation was held with Mr. Morgan. As a result a new collection was made and proved to be larger than had originally been anticipated. It was purchased on condition that it should be shown at the Paris Exposition of 1900 where it received a Grand Prize and occupied a most important position in the Department of Mines.

This latter collection was the result of a trip throughout Europe, Asiatic Russia, the United States and Mexico. The finest examples were obtained by purchase frequently, sometimes however only through exchange with

collectors or museums. This collection is now installed in the American Museum of Natural History, a crowning glory to the many magnificent assemblages of other things in the Museum.

The collection is especially remarkable for the many unique things it contains, among which are the most perfect large sapphire known, a Babylonian ax-head of banded agate, four thousand years old, and a wonderful series of sapphires, blue, pink, salmon and brown. There is also a magnificent series of beryls; a large series of tourmalines; an immense section of jade — an entire boulder but so thin that it measures not more than one eighth of an inch through. The great hyacinth with the portrait of Christ engraved on it, the gift of a Vatican cardinal to a friend, is in this collection.

The two collections as eventually completed consist of 2176 specimens of gem-stones, objects of precious-stone, and 2442 pearls. Taken in its entirety the present collection is the most extensive and carefully selected display of rough and cut stones in existence. The specimens of ancient Babylonian minerals represented by engraved cylinders constitute in themselves a quite unique possession, and the same may be said of the collection of opals and of the collection of kunzite specimens. Magnificent cut specimens of morganite must also be noted, as well as a mass of quite transparent aquamarine, the heart of the great crystal found at Marambaya, Brazil, a piece weighing fourteen pounds. This mass of aquamarine is the largest piece of gem beryl known. There are also magnificent crystals of rubellite found during the past year at Pala, San Diego County, California.

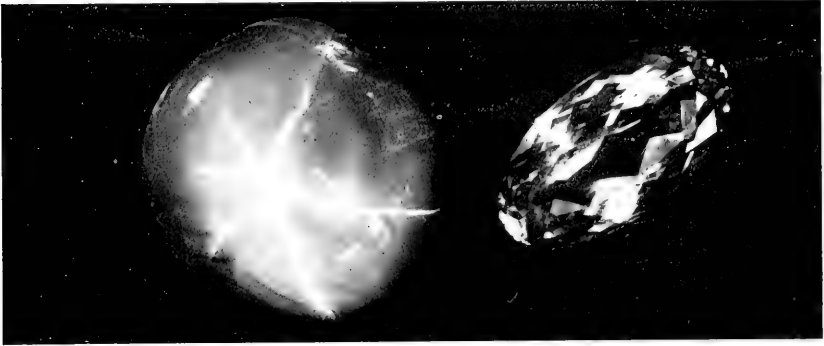
A gigantic geode thirty-five feet in height and twelve feet in width, lined with magnificent amethyst, was discovered in Rio Grande do Sul, Brazil, in 1899. This was carefully broken apart and the five largest masses measuring several feet and covered with the finest crystals, of one to two and one half inches across, many of them perfect gems, are in this collection.

The diamond crystals of American origin are quite unique, notably, a diamond crystal weighing  $15\frac{1}{3}\frac{2}{3}$  carats, found in gravel and clay of the Kettle Moraine, near Eagle, Waukesha Co., Wisconsin; another of  $3\frac{1}{6}\frac{4}{6}$  carats, a perfect octahedron, from Kettle Moraine, two and one half miles southwest of Oregon, Dane Co., Wisconsin; two diamonds, one of  $4\frac{1}{2}$  carats from Lee Co., Alabama, and the other of  $4\frac{1}{6}\frac{7}{4}$ , from Shelby Co., Alabama; diamonds found in a rock from Kimberley, South Africa and from the Vaal River, South Africa, as well as a number of pink, brownish, yellow and white diamonds, and some of the interesting round sort of the greatest hardness and density. The diamond collection comprises eight cut stones, ten ring-gems and six in the rock.

The sapphire collection numbers 166 specimens, many of them magnificent examples, such as a great blue gem from Ceylon of  $158\frac{2}{3}\frac{3}{2}$  carats; a violet stone of 33 carats from Siam; a superb yellow sapphire of 100 carats from Ceylon; one of a golden yellow weighing  $73\frac{1}{2}$  carats, and a yellow and blue one of 154 carats, also from Ceylon. There is also an engraved Indian sapphire of  $14\frac{7}{3}\frac{7}{2}$  carats. In addition to these we have an endless collection of purple, greenish yellow, pink and salmon-colored sapphires.

Among the rubies must be noted one from Burma, weighing 47 carats. Six rubies from Cowel Valley, Macon Co., North Carolina, weigh together  $6\frac{2}{3}\frac{3}{3}$  carats. A Burmese ruby carved as a head weighs  $8\frac{1}{6}\frac{3}{6}$  carats. In addition there is an interesting collection of gem-corundums, green, yellow, pink and other colors, from near Coral Creek, Montana, and a series of fine blue stones from Yogo Gulch, Fergus Co., Montana.

The collection is also enriched with a number of interesting natural crystals of unusual beauty and a large sapphire of yellow and blue, as well as with the first sapphire



The greatest and one of the most perfect star sapphires known. The star sapphire is one of the most admired of gems, the perfection of the six-rayed refraction which gives it its name varies greatly in different stones and is somewhat influenced by the color of the stone and the convexity of its polished surface

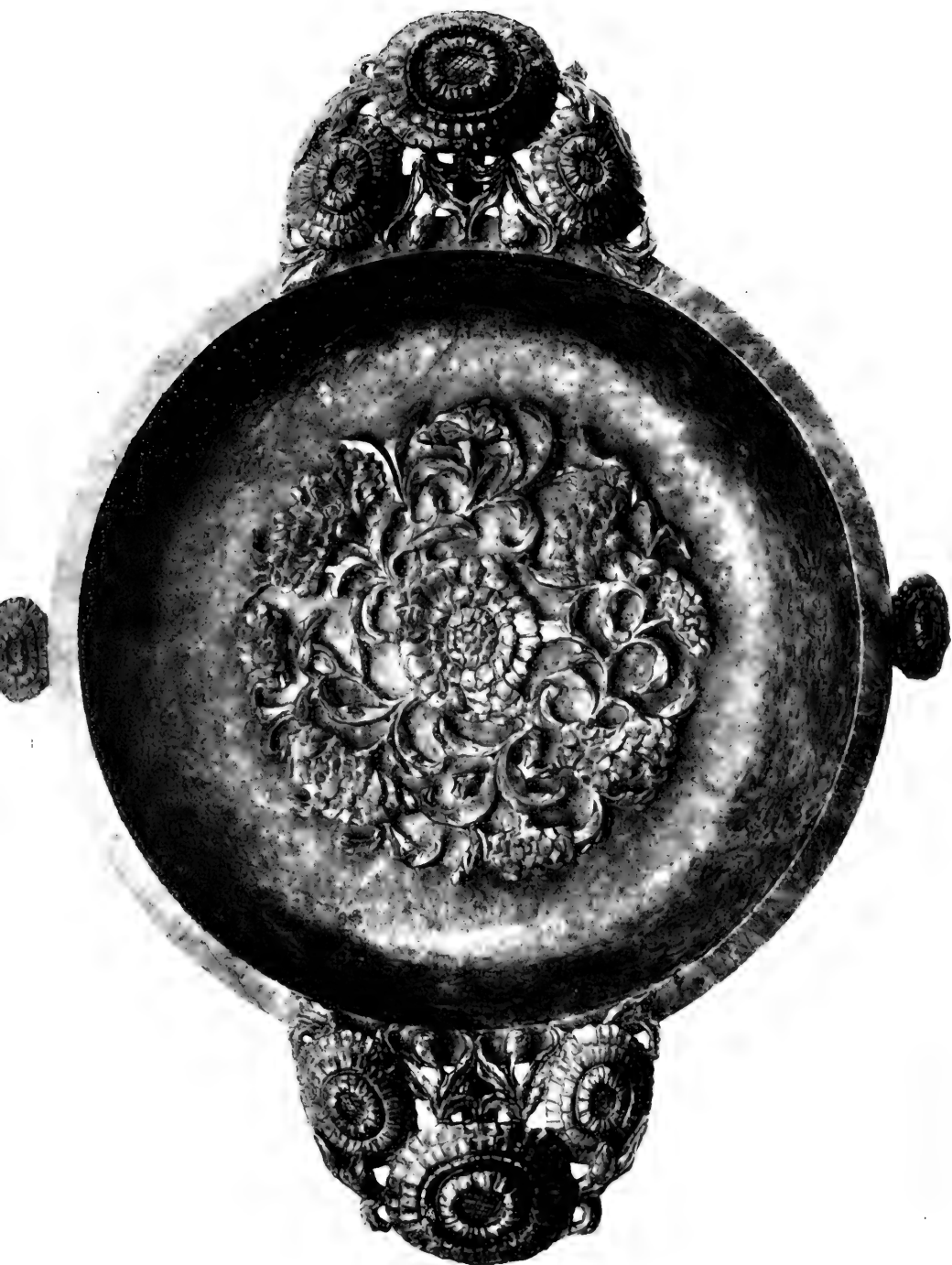
A cut gem of morganite ( $57\frac{1}{4}$  carats) from Madagascar. Morganite is the pink beryl of Madagascar, which is identical with the pink gem of the same mineral found in southern California

ever cut from material found in the United States. Besides these magnificent crystals there are a number of dark blues, pale blues, purples, greens and whites, as well as some of grayish black and brownish color from Franklin, Macon Co., North Carolina.

The beryl group comprises 57 beryls, 30 aquamarines and 13 emeralds and includes golden beryl and morganite. It is notable for the splendid cut morganite of  $57\frac{1}{4}$  carats from Madagascar. There are aquamarines of  $214\frac{7}{8}$ ,  $271\frac{7}{8}$  and  $159\frac{9}{16}$  carats respectively, from Adun-Tschilon, Siberia; another of  $156\frac{9}{16}$  carats and a great bluish-green gem of 355 carats from Ceylon. There is a beautifully cut emerald of  $32\frac{1}{8}$  carats from the Muso Mines, United States of Colombia; a cut gem of 4 carats from Earles Station, Blacksburg, South Carolina; an engraved emerald of Indian workmanship, executed in the seventeenth century and weighing  $67\frac{1}{2}$  carats. To these must be added a series of aquamarines from Mount Antero, Colorado,



A garnet cameo said to be from the Vatican collection, engraved with a bust of Christ in profile



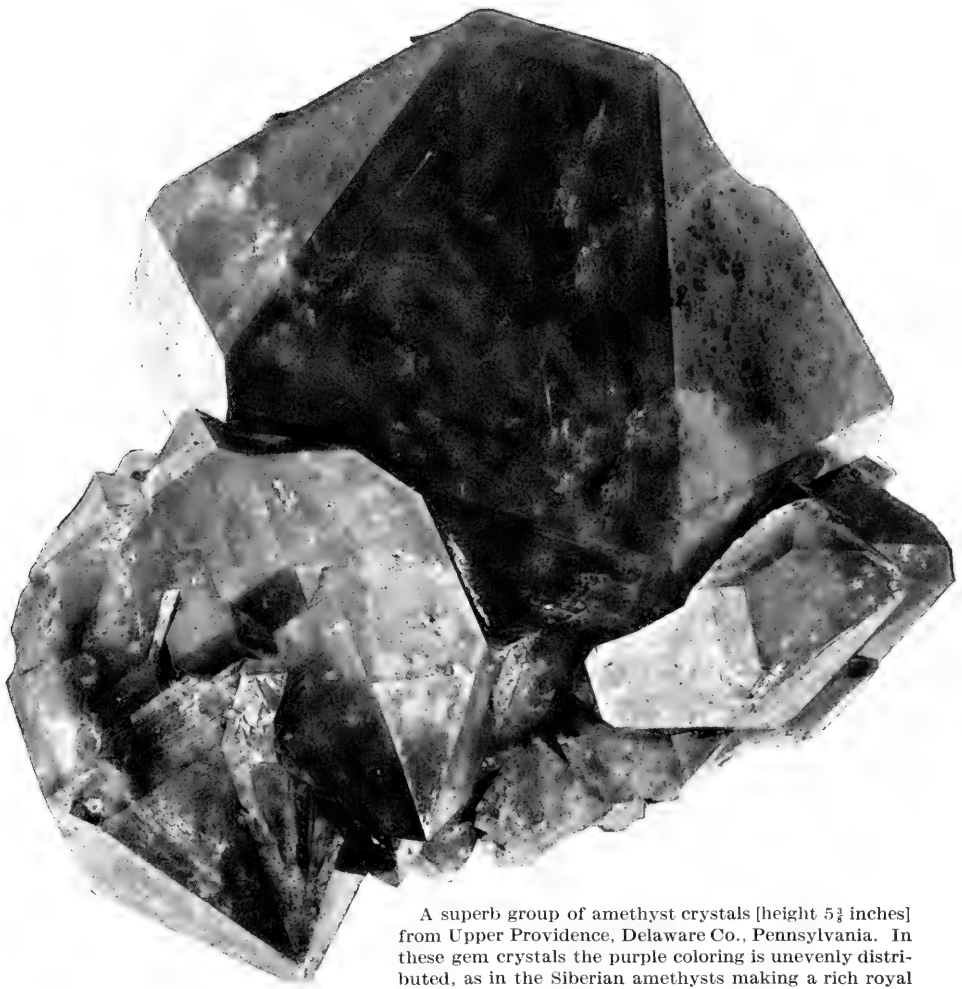




#### CARVED JADE BOWL

Mottled jade (Nephrite), deep sage green, with conventionalized motives of chrysanthemum flowers and leaves. An appreciation of the uncommon skill exhibited in this jade carving will be awakened upon considering the extreme toughness of the material, almost equalling that of quartz, and the adroit art which has shaped it from a rough block of stone. The length of the bowl is twenty inches

The jade pieces number only about two dozen as it was decided at the time of making the collection not to supplement the great Bishops Collection and other treasures of the Metropolitan Museum

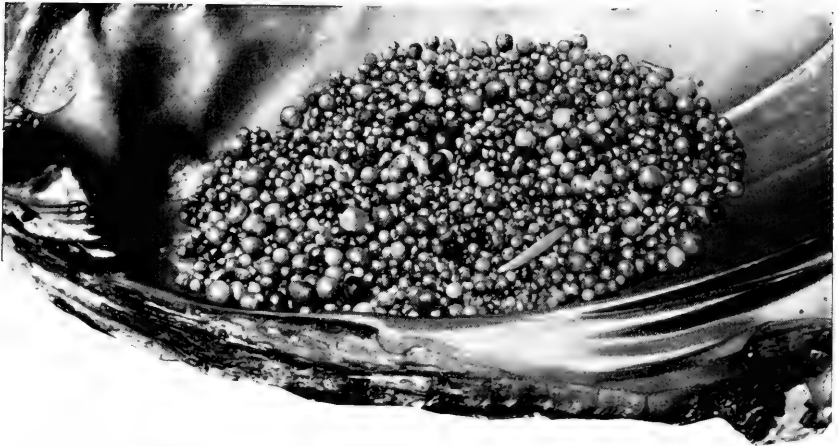


A superb group of amethyst crystals [height  $5\frac{3}{8}$  inches] from Upper Providence, Delaware Co., Pennsylvania. In these gem crystals the purple coloring is unevenly distributed, as in the Siberian amethysts making a rich royal purple tint in the cut stone equal to that of any known gem

found at an altitude of 14,000 feet, in the zone of almost perpetual snow. Additional specimens to be noted are some wonderful yellow beryls from Ceylon, one of  $57\frac{9}{16}$  carats; a beryl of  $12\frac{1}{4}$  carats from Mt. Mica, Paris, Maine; twelve stones, one of  $14\frac{3}{8}$  carats from Litchfield, Connecticut, and a deep brown specimen from the Ray Mine, Mitchell Co., North Carolina.

The collection of tourmalines numbers 79 cut and 13 uncut specimens. Here we have examples as varied as the sapphires in their coloring. There are magnificent red and pink stones from Pala Chief, California; one from Madagascar weighing  $40\frac{1}{8}$  carats; another from Sarapulka, Russia, as well as specimens from the state of Minas Geraes, Brazil. A large irregular mass is said to be from the eye of an idol in India and to have been secured during the Sikh war. A series of the wonderful bicolored stones, part yellow and green, the balance of the stone being red, are from Mesa Grande, California; there is also a red and blue bicolored stone from the same locality. Noteworthy and interesting are some tourmalines from Brazil in which there is a red center bordered by white, with an outer line of green. A series of more than a dozen blue, dark green and green tourmalines come from the famous locality at Mt. Mica, Paris, Maine.

The topaz series numbers 55 cut and 15 uncut stones. It is one of the most



Portion of fresh-water clam shell holding a cluster of pearls. Pearls of the greatest value are satiny in surface, pearly white in color, and almost ideally perfect in symmetry. Such pearls command the highest value. The pearls in the Morgan collection number 2442. The series includes a large number collected in different parts of the United States to illustrate varying forms and colors

important, embracing magnificent blue gems, one weighing  $308\frac{1}{4}$  carats from Ceylon; another of  $98\frac{1}{3}\frac{1}{2}$  carats from Alabashka; a round blue stone of 120 carats from Ceylon; another great topaz of 600 carats, faultlessly cut, comes also from Ceylon. It is the masterpiece of cutting of one of the greatest lapidaries who has ever lived in India, as is also the blue Ceylon stone of  $308\frac{1}{4}$  carats. The yellow and pink topazes from Minas Geraes are superb; one of a deep yellow weighing 61 carats, and a darker one, more brownish yellow,  $46\frac{1}{2}$  carats. Then there is a splendid triangular, sherry-colored stone, weighing  $16\frac{2}{3}\frac{3}{4}$  carats from Ceylon; a beautiful pink specimen of  $19\frac{7}{16}$  carats and another of  $49\frac{5}{3}\frac{1}{2}$  carats from Ouro Preto, Minas Geraes, Brazil. A great pale amber-colored stone of  $193\frac{3}{4}$  carats is from Cheyenne Mountain, El Paso, Colorado; there are also specimens from Australia and other localities.

In the quartz series among the rock crystals, Spanish topaz, and rose quartz, there are many fine specimens — notably the two crystal balls from Mokelumne Hill, Calaveras Co., California. The one of  $5\frac{1}{2}$  inches diameter weighing 6.3 pounds is flawless; the other of  $7\frac{1}{8}$  inches diameter with a weight of 8.17 pounds, is a large piece of crystal containing numerous natural markings. There are wonderful examples of seals and other ornaments cut by the famous lapidaries of the Ural Mountains and by Chinese lapidaries of the seventeenth and eighteenth centuries, as well as vases and snuffboxes by the expert lapidaries of the Nahe Valley in Germany.

The amethyst series is fully as complete and contains many unique gems, such as a great group of crystals from Upper Providence, Pennsylvania, and a carved hand of Buddha from Japan. There may also be seen a large hexagonal gem, three sectors white and three sectors purple, and a magnificent royal purple gem of  $142\frac{5}{3}\frac{1}{2}$  carats from the Ural Mountains. Some large and superb gems come from North Carolina; Deerhill, Maine, and other localities.

The garnets are represented in their full range of color — red, purple, honey-color, brown, green and black. A remarkable series of spessartite comes from Amelia Court House, Virginia, several dozen gems weighing from one carat to the great gem of  $96\frac{1}{16}$  carats. The two finest found in this locality weigh respectively  $33\frac{5}{16}$  and  $36\frac{4}{16}$  carats and are unique in size, perfection and color.

We have already noted the hyacinth cameo, engraved with a bust of Christ in profile, said to have been in the Vatican collection. A garnet bowl engraved with Indian designs weighs several ounces, and a small dish, cut from garnet found at

Salida, Colorado, is nearly two inches across. Certain of the ruby-red garnets were found on the ant-hills of the Navajo Reservation, New Mexico, where they had been brought out by the ants. Rose-purple rhodolite garnets come from Franklin, Macon Co., North Carolina.

Several dozen demantoid garnets, so often erroneously termed olivine, of a rich emerald green with a light tinge of gold and showing a play of color like the diamond were brought from Poldnewaja, Ural Mountains. A magnificent polished garnet crystal weighing over a pound comes from Salida, Colorado.

One of the most brilliant cases of the collection is the opal case which contains many fine gems. In it may be viewed a wonderful series of two dozen rich golden and fire opals from Querétaro, Mexico, and a number of fine specimens from White Cliffs, New South Wales. A mass of precious opal weighing nine ounces originally formed the bone of a prehistoric animal and was naturally changed to precious opal.

It was intended that the collection should not only represent the varieties of precious stones and the various forms of cutting and working these in ancient, mediæval and modern times in all nations, but should also include the stones in more especial use in different countries, manipulated, carved or cut by the artisan of the country in question. Groups of carved gem-stones may be seen in the form of fruits, and there is a series of carved vases made in Siberia, where the industry was introduced by Catherine the Great, who sent two Italian lapidaries to teach the natives, with the result that at the present time more than one thousand people are thus making a good living.

Amber is a treasure that has been prized from the earliest times. To secure it the Phœnicians visited the Baltic; the Germans have traded it to China, Africa and to many distant lands; it has been found in French graves and it is worn in the form of beads by the natives of Africa.

Here we have it represented in a variety of forms, such as Indian beads and snuff-bottles of Japanese manufacture; there are also some pieces containing insects which were imprisoned millenniums ago in the gum of the tree. For amber is not indeed the tears of the Heliades as the classic myth explains, but the tears oozing out of the bark of wounded trees, as was in fact believed by some of the more enlightened among the ancient writers.

When the lilac and purple spodumene was found in 1903-4 and named kunzite, Mr. Morgan acquired a series of the finest stones, some of which had been figured as type specimens. This interesting series of crystals included some really wonderful gems. We may instance one of 224½ carats, the largest type specimen. Another superb gem weighs 118 carats.

The jade collection comprises only about two dozen examples. It was decided not to supplement the great Bishop Collection and other treasures of the Metropolitan Museum. But there are some important pieces of Chinese jade, such as a great bowl measuring twenty inches across; a white bowl of twelve inches diameter, with two swinging handles; a jade cup, with cover jeweled with diamonds and rubies, from India; a bowl of jadeite (melting snow) and an ellipse-shaped bowl of seven inches diameter, mounted on gold and enamel, originally belonging to Louis XVIII. A jadeite figure from the Valley of Mexico weighing four pounds is also here, and a snuff-bottle and a green vase seven inches in height.

No single specimen is of greater importance from an archæological point of view than the ancient axhammer of banded agate. This was obtained by Cardinal Borgia while at the head of the Propaganda. It was offered by the Countess Ettore Borgia to the British Museum, but was eventually acquired by Count Michael Tyskiewicz for 15,000 francs (\$3000); soon after his death it was purchased by Messrs. Tiffany and Company and was presented by Mr. Morgan to the American Museum.



The carmine tint of this rubellite [height  $9\frac{1}{2}$  inches] in contrast with the almost colorless and glassy surface of the quartz crystal forms a mineral wonder. Rubellite is a lithia variety of the variable silicate known to mineralogy as tourmaline and the intergrowth of quartz and tourmaline is noticed at many localities. Invariably the quartz as a secondary crystallization has formed around its mineral companion, as a foil to the showier associate

We have touched upon the historic value of the series of Babylonian cylinders, composed of various minerals such as serpentine, steatite, hematite, lapis-lazuli, jasper, agate, anhydrite, amazon stone, shell, aragonite, chalcedony, marble and quartz. These cylinders date from 4000 to 400 B. C., and are inscribed with figures and names.

To illustrate the history of gem engraving there are fine examples of Persian engraving offered by a series of fourteen Persian seals of various ages, bearing from a few to several hundred words of the beautiful tracery engraving that only the Oriental can accomplish with full success.

Agatized wood from Chalcedony Park, Arizona, is well represented, some sections measuring two feet across, polished as smooth as the finest mirror, and showing parts of the prehistoric trees replaced by silica and oxide of iron, as if nature had painted them in orange, red or brown, in pinkish or bluish hues, and in other colors, fairly

rivaling the brush of any modern artist. The rock crystal is at times accompanied by crystals of rutile, hornblende and tourmaline. In these the hairs are frequently as fine as human hair and again they may be as thick as the lead of a pencil. In the white colorless quartz the crystals are nine inches long; in others the crystals are brilliant reddish brown, twisted and distorted. Fine delicate rutile "hairs" in quartz crystal come from Madagascar. There are some interesting quartz crystals in which the successive growths of the crystal have been registered by a deposition of some other substance as the quartz was growing, presenting a series of "phantom crystals." These have been polished on the sides.

The skill of the lapidary in cutting and polishing excessively thin sections of precious minerals is demonstrated in the case of a piece of jade thirty inches in length, twenty-four inches in width and one-fourth of an inch thick, polished on both sides, a triumph of lapidary work. Another example from the Onot River, from distant Siberia, is a section of a boulder skillfully mounted, only one-sixteenth of an inch thick, and yet measuring twenty inches in length and twelve inches in width. A section of a meteorite from Kiowa Co., Kansas, is filled with golden yellow olivine (peridot).

The turquoise exhibit is of unusual interest; very notable is the great Persian turquoise engraved with two thousand words, an entire chapter of the Koran; this laborious task must have required a year's time for its accomplishment. Additional examples here are a turquoise matrix from Persia; bone turquoise (odontolite) from France; a magnificent turquoise from Los Cerrillos, New Mexico, as well as beads and charms made, mounted or cut by the Navajo Indians.

The pearl series numbers 2442. It contains a great variety of examples collected to illustrate the various forms and colors of freshwater pearls in the different parts of the United States. Some of them are large and important gems and are of great beauty and value. There is an extensive series of common clam, abalone and conch-shell pearls.

The rare gems are well represented, such as the titanite from Tavetschtal, Switzerland, which almost rivals the diamond in brilliancy.

Of other gem-minerals we have brown and gold andalusite from Ceylon; euclase from Brazil; cut sphalerite from Santander, Spain; cyanite from Russia and Bakersville, North Carolina; apatite from Georgia and from Canada; rutile; sunstone; chlorastrolite from the one locality in which it is found, Isle Royale, Lake Superior, Minnesota; prehnite from Paterson, New Jersey; oligoclase from New Bakersville, North Carolina; microcline from Norway; thomsonite; willemite; hyalite from Lake Co., California; and many others. Moonstone is well represented by a number of large and beautiful gems.

The agates and moss agates form a great series of large, important and beautiful specimens, notably the great bowl that measures thirteen inches across, cut out of natural agate and showing the wonderful mammillary structure. Some "mocha stones," as agates are termed in India, measure four inches across. Interesting in their way are a number of beautiful smaller pieces from Brazil and Wyoming.

The Morgan collection at the 1900 Paris Exposition aroused such great and universal interest in gems and minerals, that when Mr. Morgan's attention was drawn to the Bement collection of minerals he realized that the people as well as the Museum authorities would greatly appreciate it, and he generously presented to the Museum this greatest private collection of minerals, embracing also one of the greatest private collections of meteorites.

To recapitulate, the catalogue of the collection numbers 2064 cards listing the following specimens: pearls 2442; diamonds — rings, 10, cut stones 8, in rock 6; sapphires 166; beryls 57; aquamarines 30; emeralds 13; topaz, cut 55, uncut 15; tourmaline, cut 79, uncut 13; beads 500; cylinders (Babylonian) 32; shell cameos 3.

## A TREASURE HOUSE OF GEMS

AN APPRECIATION OF THE BEAUTY OF THE MORGAN COLLECTION IN THE AMERICAN MUSEUM OF NATURAL HISTORY

By L. P. Gratacap

UNITED with each other in clustering groups, as in jewelry and decorations, gems gain in splendor, yet the claims of education in the halls of a museum of natural history demand that gems for specific study be individualized and separate. The only way to produce the impression of richness and brilliancy is to have them profusely shown, to be lavish and generous in examples, with a kind of luxurious extravagance even that startles.

In the Morgan gem collection something of this effect is indeed produced. As we pass in review the cases in the gem room, each with few exceptions devoted to a single gem, the aggregate effect is sensibly imposing — a feeling reflected in the average visitor by his bewildering estimates of its value. Admiration arises in part from the comprehensiveness of the collection, the wide embrace within it of the minerals that may serve the purposes of decoration, or enter, less conclusively as gems, into works of art, the rococo of the artificer in quartz, jade, jadeite, rhodonite, fluorite, gypsum, serpentine, agate and chalcedony.

Herein has been displayed the exhaustiveness of Dr. Kunz's inquiry, sympathy and learning, for the present Morgan collection of gems is practically the consolidation of the two World's Fair Exhibits of Tiffany and Company at Paris in 1889 and 1900, and Dr. Kunz gathered for those occasions something suitable from every available source.

The primacy of gems remains, to-day as always, with the diamond, the sapphire, ruby and emerald, curiously invaded by that frail product of the sea and the river, the pearl of which Julius Wodiska says, "In its purity, liquid beauty, and charm of romantic and poetical association the pearl — aristocrat of gems — leads even its peers of the highest rank, the diamond, emerald, ruby and sapphire." Perhaps we might quarrel with this impersonation of the pearl, but there can be no hesitation in ascribing to it a wonderful charm as we see the varied and fascinating display in the Morgan collection.

From this case of pearls the visitor may learn also the scheme devised by Dr. Kunz for the whole collection of gem-material, that it might subserve quite completely the purposes of scientific discrimination and comparison. In this case of pearls are the calcareous secretions of the hard-shell clam (*Mercenaria mercenaria*), our edible quahog; the less attractive offerings from the pearl factory of the common oyster; the rosy rolls from the giant whelk of the south (*Strombus gigas*); the dissymmetric nodules, with their vivid sheens, from the abalone (*Haliotis splendens*) of California, and the priceless dainty and delicate spheres, pale silvery and lilac-tinted, from the mantles of the freshwater clam (*Unio*). Here are perfect and baroque pearls, hinge pearls and pearlaceous masses, the exhibit unduly

limited for want of space to accommodate the abundant overflow now hidden in storage.

The visitor leaning over that variegated garden of the sapphires learns with interest the remarkable range of colors in this gem: the vivid electric blues, paler cerulean hues, the deep pansy tones, the pinks, translucent and feeble, and the almost opaque turgid pigeon-blood stones, and green, golden yellow, salmon, gentian, to colorless water stones. The opposite case reveals the superb play of color in beryl from the peerless emerald, through haunting changes of blue and green in the aquamarines, to the saffron yellow of the golden beryl, while near it is the amazing show of tourmaline, surprising in its vagaries of sharply lined and interblended tints, with its contrasted triple points of emphasis in green, red and blue. The topaz, less arrestingly, exhibits its departures from convention in the burnt half-caramel tone of the Brazilian stone, to gentians (mostly artificially produced), yellows, and the limpid masses.

Case follows case, holding the precious and semiprecious stones, approximately in the order of their commercial merit, an order not invariably sustained by taste, and yet practically valid. The chrysoberyls (alexandrite) with their tantalizing caprices of color, the rather insipid spinel; the rich moorish browns of the zircon, among which note the raspberry glints of the hyacinth, the effective bottle green of peridot, and the coarser — yet at times refined to the point of a deliberate superiority almost over ruby — garnet with its audacious greens and honey-yellow spessartites.

Here is a supremely showy case of the chameleon amongst gems, the tortuous and vagrant opal, and here a splendid group of amethysts — the bishop's stone — with a regal group of crystals from Delaware County, Pennsylvania, in the center of it. A case of mingled degrees and orders, in the hierarchy of gems, adjoins it, where, with recognized families as the moonstone (*adularia*), are joined a host of lesser aspirants to fashionable attention, such as titanite and euclase, a motley throng not unlike the obsequious courtiers before the gates of Timon of Athens, seeking honors to which they have no claim.

But to some eyes, more beautiful almost than anything else are these marvelous lilac, gentian, or pale carnation slabs of kunzite (spodumene), a mineral wonder, found buried far below all human contact in the mountains of southern California, and now fascinating the world of ostentation with its subtle radiance.

Here too is amber and turquoise and gold, lovely in themselves but lovelier in combination, and then, with a fine challenge to the prerogatives of the sister museum, are carved, cut and polished vessels and designs in quartz, chalcedony, agate, jade and jadeite.

It must always stand true that this treasure-house of beauty is in itself a wonderful monument to the man who thus generously enriched the American Museum.





CARVED AND POLISHED CHALCEDONY-AGATE BOWL

This bowl measures thirteen inches in diameter and is cut to show the mammillary structure of the natural agate. The carving and polishing of such a vessel implies patience, skill and a developed artistic appreciation of the natural qualities of the stone. The headquarters of the larger portion of agate-cutting and polishing is at Oberstein, Germany



"THE LAST STAND"

Model by Mr. Carl E. Akeley for elephant bronze. [Photo one-fourth size of model]



The elephant trap used by the Kara Moja consists of a "basket," such as is here shown, and a slip-noose of rawhide cable placed over a hole dug in the trail. The cut shows the Kara Moja antelope trap which is similar to the elephant trap but of smaller size

## THE WORK OF CARL E. AKELEY

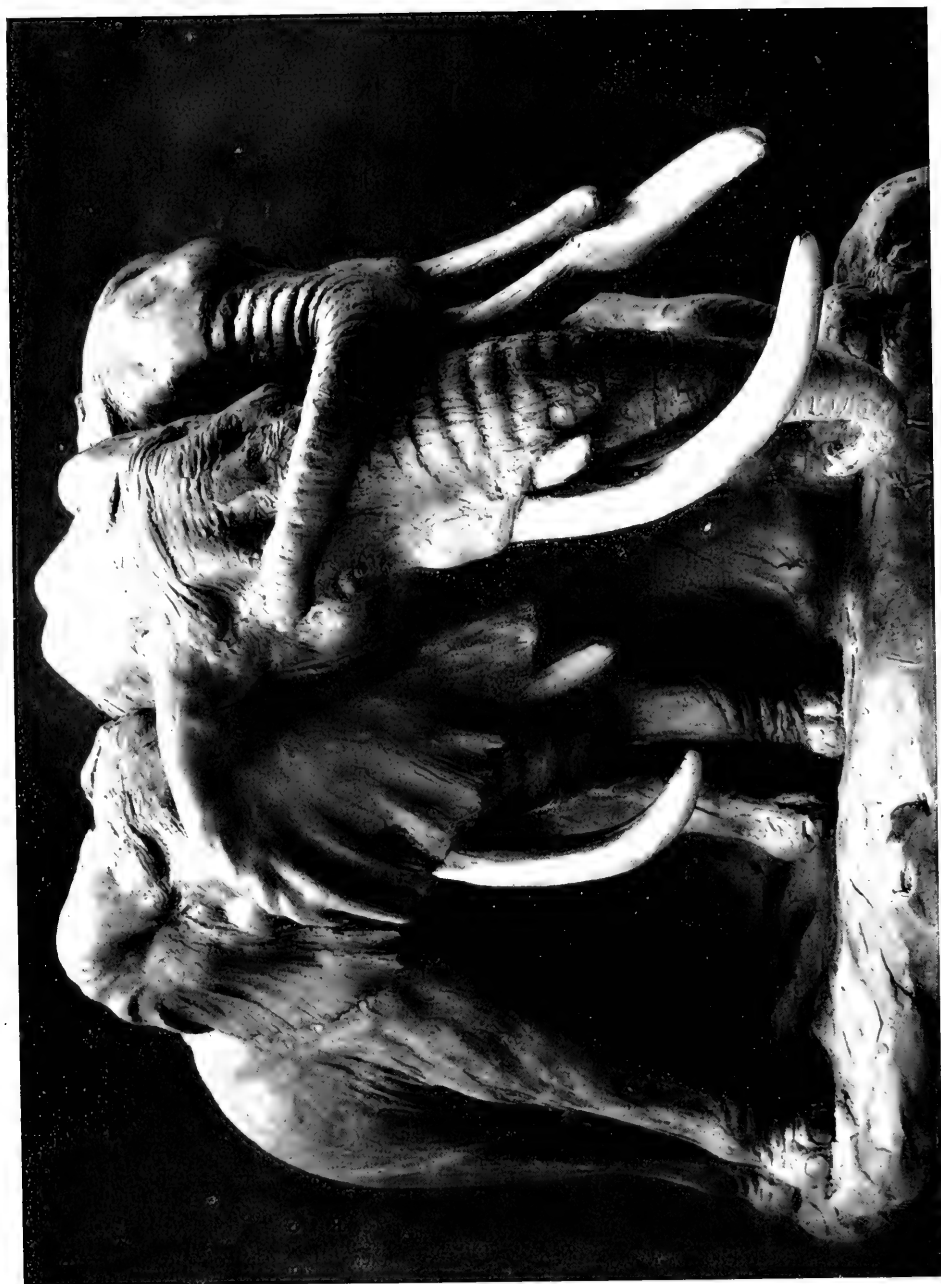
WORK on the elephant group planned by Mr. Carl E. Akeley for the American Museum is to begin in early summer. Many studies are already in progress both for the group and for supplementary miniature groups and single figures to be cast in bronze and used to supplement the life size group, thus illustrating in full the character and habits of the African elephant.

Some of Mr. Akeley's work is to be seen in the Chicago Field Museum — a series of groups of African mammals, a very beautiful seasonal series of the Virginia deer and as the central piece of the Museum a statuesque group of two elephants. At present Mr. Akeley has connection with the Field Museum in an extension of the African mammal series, working at the moment on an African buffalo group of large proportions.

The elephant group planned for the American Museum, a family group of massed elephants, five in number, is destined for the center of the African hall in the proposed new wing. The group, statuesque in effect, without habitat, will tower eighteen feet from the floor, elevated four feet on a pedestal base in order to give an unobstructed view on first approach from the ends of the hall over two low groups of rhinos one at either end. These three groups in a space 44 by 136 feet will be mounted according to Mr. Akeley's newly devised method for non-haired mammals which gives them the permanency of bronze and allows exhibition without cases, exposed to the varying heat and humidity conditions of the open hall.

The elephant group will have in addition to the correlated bronze miniature groups and single figures already mentioned, bas-reliefs in bronze on the sides of the pedestal. These will show the massing of the animals in herds, and other features of the story of the African elephant and its relation to the country and to the natives. As planned, the great central space of the hall with its elephant and rhino groups will be encircled by a series of thirty-two panoramic groups with habitats and painted backgrounds, each composite in character, so that together they will show several hundred species. The corner groups for instance will represent the Congo forest (okapi the center of interest), African plains, African desert with typical water-hole (giraffe the center), and a river scene of Africa. Each of these will contain many species, the last for example, crocodiles, hippos and turtles in the water, and in the trees that border the river different species of monkeys and birds. These thirty-two groups will be in cases so constructed as to be under automatic control regarding light, temperature and humidity, entirely independent of the varying conditions in the main open part of the hall.

Two requisites underlie successful work in taxidermy — as the mounting of animals for museum exhibition is known — in addition to accuracy of the scientific truth to be demonstrated. The first of these is technique of such



“THE WOUNDED COMRADE”

Model by Mr. Carl E. Akeley for elephant bronze. [Photo one-third size of model]



**MODEL OF "THE WOUNDED COMRADE" VIEWED FROM THE RIGHT**

An old bull elephant seriously wounded is being helped away from the danger zone by his two companions. Most elephant hunters of much experience have stories to tell of such instances which are of quite frequent occurrence. Such assistance is probably more often given to old bulls than to younger bulls or cows. This marked affection for an old bull on the part of the rest of the herd — both sexes — is strikingly apparent



MODEL FOR BRONZE, "THE WOUNDED COMRADE," VIEWED FROM THE LEFT

### "A PORTRAIT"

Model for bronze by Carl E. Akeley. Study of an old single tuskler with whom Mr. Akeley came to feel quite familiar, coming upon him three times at points from thirty to fifty miles apart. This splendid old fellow was recognizable not only by the one fine tusk but also by a large swelling near the base of the trunk which may have been the result of a thrust of a tusk in a battle with a rival. The loss of one tusk was doubtless a blessing for had he carried a mate to the one that he had, no sportsman or ivory-hunter, white or black, would have passed him by.

Mr. Akeley tells of the third meeting as follows: "We were hunting and studying elephants in Ungoro. We had made camp one afternoon near the village of a handful of natives, the remnant of a population which had been all but exterminated by sleeping sickness, when natives came to us saying that a single bull was within an hour's distance. They took us directly to him when we immediately recognized our old friend of the single tusk and the bump on his face, all unconscious of danger as he slowly gathered a "trunkful" of dirt and threw it over his back. For the third time we made our salaams and withdrew."



character that not only is the mount flawless in workmanship but it is fitted also to endure unchanged for many years — fifty, one hundred, surely even longer. For in this age of advanced experiment and knowledge such a result alone justifies the money and effort. Still more important than money and effort however, is the fact that the animal life of the globe in its wild state, especially the large mammal life, is in very large part approaching extinction because of the encroachments of civilization. For this reason, museum records made to-day should be historical in that they embody accurate knowledge in permanent form for the future. Also it chances that the knowledge which can be put in the graphic form of groups is precisely that part of zoölogical science which it is most important to-day to preserve — namely, field knowledge or ecological records, the interrelationships of any given race of animals with other races and with environment, which if not gained in the near future will be lost forever. Collections are important (and they too must be put into shape for enduring) and they must be made in large series before too late. Work on them however, with the systematic, anatomical and comparative results which in combination are of such intrinsic value in the general body of science, will not be injured or lost by delay.

The demands of the time in the matter of ecological record are strong upon museums and particularly upon the American Museum which aims in so large a degree to put its information in graphic form because of the enhanced educational value. Therefore that the opportunity seems at hand when Mr. Akeley will give his power as a taxidermist to express his large field knowledge of African mammals, is a triumph for science even in greater degree than for taxidermy or for the development of the American Museum.

But there is a second requisite for the adequate mounting of animals. It lies in a combination of the life and of art, a choice of life facts, positions, relations such as can be set forth in accordance with what we recognize as artistic effect. The taxidermist who can produce flawless and relatively enduring technique is rare; the man who combines with these the second requirement is still more rare. Mr. Akeley stands pretty much alone, far and away the best taxidermist of the world. Quoting a critic of repute in museum matters: "Mr. Akeley to the men who often bear the title of taxidermist stands as Rodin and French to the cave artists."



# THE PERSONNEL OF THE CROCKER LAND EXPEDITION

By Edmund Otis Hovey

THE organizing institutions of the Crocker Land expedition consider themselves fortunate in the personnel of the staff and congratulate the scientific world at large upon the results that may reasonably be expected to flow from the energy that has been and is to be put into the enterprise.

The leader of the party, Donald B. MacMillan, who was coleader with George Borup of the expedition as originally planned, won his spurs in Arctic work as one of Admiral Peary's trusted lieutenants during the successful quest of the North Pole in 1908-1909, traveling more than two thousand miles with dog team along northern shores, even to the most northern point of land in the world, Cape Morris Jesup. It was from this point that MacMillan and Borup made their record march covering 336 miles in eight days. Mr. MacMillan is a graduate, A. B. and Honorary A. M., of Bowdoin College. He has spent the three and one-half years since his return from the Arctic in studying, lecturing and traveling. The summers of 1910 and 1912 were spent in exploratory, ornithological and archaeological work in and along the coast of Labrador. The year 1910-1911 and the past autumn and winter have been spent at Harvard University working in anthropology and practical astronomy. Mr. MacMillan is of Scotch ancestry and was born in Massachusetts thirty-seven years ago.

W. Elmer Ekblaw was born in Illinois and is thirty years old. His portrait shows him as he is, strong, sturdy, self-reliant and reliable, as befits his Scandinavian ancestry. He took his degrees A. B. and A. M. in course at the University of Illinois, specializing in geology, botany and ornithology. He is a valued instructor in geology at his Alma Mater. He has done much field work in that science and will have charge of the geological and botanical work of the expedition.

Ensign Fitzhugh Green, U. S. N., graduated at the Naval Academy, Annapolis, four years ago, when he was only twenty years of age. He was born in Missouri of old Colonial stock and received his appointment to the Academy from that State. Mr. Green's experience has been largely at sea, where his duties concerned navigation and all the complicated machinery of a battleship. He was in command of a turret on the "Michigan" and has likewise done mapping of coast lines. He has been taking special studies during the past year in cartography, meteorology, seismology, terrestrial magnetism and wireless telegraphy in Washington, D. C. and will have charge of these branches of the expedition work. His experience in the navy has already taught him how to command as well as to obey.

Maurice C. Tanquary is a Wisconsin boy, although his parents and his grandparents for several generations were born in New England. He was



graduated from the University of Illinois in the same class with Mr. Ekblaw, but he continued his college work at the same institution to include the degree of Ph. D. He specialized in zoölogy, more particularly entomology, and he is well fitted to take charge of the zoölogical work of the party including that on fishes and mammals. He is thirty-one years old and is full of the life and vigor that will be invaluable to the party during the long hours of darkness in the second winter.

**MR. MAURICE C. TANQUARY**

*[Upper photo]*

Mr. Tanquary is a graduate of the University of Illinois. He will act as zoölogist of the Crocker Land expedition

**MR. W. ELMER EKBLAW**

*[Lower photo]*

Mr. Ekblaw, instructor at the University of Illinois, will have charge of the geological and botanical work





ENSIGN FITZHUGH GREEN, U. S. N.

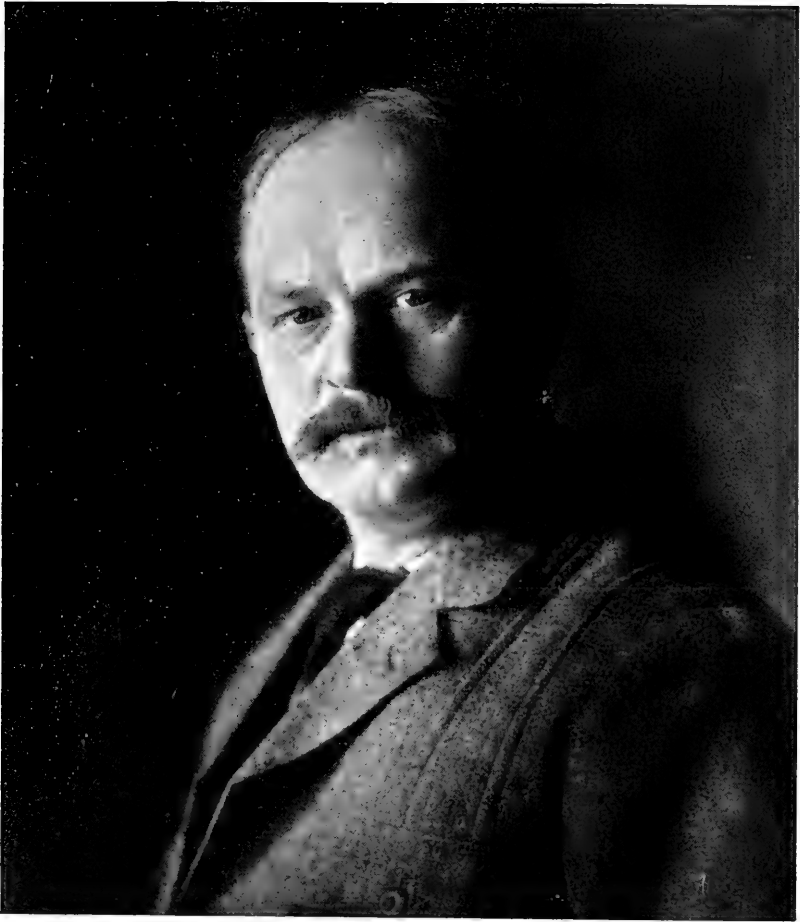
Ensign Green, who joins the Crocker Land expedition which is under the leadership of Donald B. MacMillan, is a graduate of the Naval Academy, Annapolis, and has had experience at sea, in part on the "Michigan." He will have charge of the meteorology, the mapping of coasts, records of earthquakes, wireless telegraphy and allied work

In addition to the strictly scientific staff of the expedition there will be a surgeon. The climate of the Arctic regions is so healthful for white men that there is not likely to be much for the doctor to do for the staff aside from the treatment of frost bite and the results of accidents, but the Eskimo furnish a fertile field for medical study and maintaining the health of the whole party through properly balancing the diet is of high importance. The surgeon has not yet been appointed although there have been many applicants for the post.

The party includes an expert electrician to have the direct care of the outfit of wireless and other electrical instruments at headquarters and his duties will include making the meteorological and seismological observations during the absence of Mr. Green. A good mechanic and boat-builder who combines also the qualifications of being a good camp cook has been engaged. The whole staff will seem nearly perfect, when a competent surgeon has been secured.

No American expedition has ever gone to the Arctic regions better equipped as to men, supplies and instruments than this, which is to start for the north in July of this year under the auspices of the American Museum of Natural History and the American Geographical Society with the cooperation of the University of Illinois and the assistance of the United States Navy Department, the Department of the Interior (through the Geological Survey and the Bureau of Mines), the Department of Agriculture (through the Weather Bureau), the Department of Commerce and Labor (through the Coast and Geodetic Survey), the Carnegie Institution of Washington (through its Bureau of Terrestrial Magnetism), Yale University, Colgate University, Bowdoin College, Worcester Academy and Groton School.

Such an array of backers gives the enterprise a national character which is further emphasized by the large number of individuals, about one hundred thirty in all, who have contributed liberally of their means and the score or more of prominent publishing houses and other firms that have made either direct donations of their valued goods or concessions in prices that have given the expedition's funds much greater purchasing power than otherwise they could have had. Wireless telegraphy is to be utilized for the first time to further the work of an Arctic expedition. This will be used in connection with the fully equipped weather bureau station to be established at the home base of the party on Flagler Bay (Kane Basin). The idea of being in direct frequent communication with an exploring party north of 79° north latitude is one to stir the blood and fire the imagination, at the same time that it removes some of the terrors of the long Arctic night.



## BIRD STUDIES IN THE ANDES

QUOTATIONS FROM THE LETTERS OF FRANK M. CHAPMAN,  
LEADER OF AN EXPEDITION TO SOUTH AMERICA

**M**R. FRANK M. CHAPMAN is in Colombia for the purpose of making a study of the life zones of that part of South America. The conditions in the region are peculiar. In a short distance with increasing altitude occur tropical, temperate, sub-boreal and alpine zones, the bird life in each zone distinct from that of the others.

Also studies are being made for a panoramic group to continue the series of bird habitat groups in the American Museum. The following quotations are from letters received from Mr. Chapman during March:

HONDA, *February 9*

... One month ago we left New York but in spite of the fact that the voyage from New York to Baranquilla consumed eleven days and that plowing up the water

— and mud — of the Magdalena twelve more, we already have over six hundred birds and the study for the great Magdalena group has been made. We let no opportunity to collect escape us while sailing up the Magdalena. Whenever the steamer stopped for cargo or firewood the six men of our party rushed ashore — somewhat to the astonishment of the inhabitants, who not infrequently asked if we were starting a revolution! The bird skins were prepared at once on the steamer, where we were given every facility for work by a sympathetic captain.

The view for the group was made at a point above Honda, at an elevation of 2700 feet, near the summit of the first ridge of the Eastern Andes. From this point one looks west across the Magdalena Valley to the Central Andes. The floor of the valley is broken by a series of low, strongly modeled ranges through which the Magdalena winds in graceful curves and the blue wall of the Central Cordillera is crowned by three snow masses, Tolima, Isabel and Ruiz, having an elevation of 16,000 to 18,000 or more feet. In its impressive proportions, its variety of form and color, its singularly beautiful and pleasing composition, this view is by far the finest I have ever seen.

All the men<sup>1</sup> are working with enthusiasm and this in the face of conditions trying even to those of us who have had experience in the tropics. Lying at the western base of the Eastern Andes, the Magdalena is not cooled by the easterly trades and the mercury hangs about 90°, while the air is charged with a high percentage of moisture. I am glad to say that to-morrow we begin our section from the Magdalena to the Meta at the eastern base of the Eastern Andes, thus completing the survey of the three Colombian Andes from the Pacific to the Orinoco drainage. . . .

"HEART OF THE ANDES," *February 25* . . .

. . . In order to avoid the expense of running a large pack-outfit for the two hundred miles through the Eastern Andes, I have divided the party into two or three each, and am relaying it along the trail with six mules, three for the saddle and three for "cargo," as it is here called. . . . Things move slowly here and a week was of necessity passed in Bogotá while I purchased the mules and hired men for our journey. . . . The week was also used to establish relations with resident naturalists (few in number and chiefly French priests), to pay the respects of the Museum to various officials including the President of the Republic, the American and British Ministers, and to ascertain the sources of the so-called "Bogotá" birdskins which for the past seventy years have been reaching the museums of Europe and America, hitherto constituting practically the only specimens of birds from this region. . . . Investigation has yielded the most surprising and definite results. In brief, the area drawn on by the Bogotá dealers is so large that these dataless specimens are not only scientifically valueless but also actually misleading, and the discovery of this fact alone is worth a journey to Colombia.

BUENA VISTA, *February 28*

We finally reached the summit of the last ridge of the Andes (altitude 4000 feet). At our feet the llanos stretched indefinitely eastward and for the first time since entering the mountains we saw the horizon below us. Westward we look back up the valley of the Rio Negro. Justly is this place named Buena Vista: . . . . It is very rich in bird life. One collecting of sixty-six specimens brought a result of thirty-four species, and in a single morning's work we have collected as many as thirty-eight genera. . . .

<sup>1</sup>The assistants of the expedition are as follows: Mr. Louis Agassiz Fuertes, artist; Messrs. George K. Cherrie, formerly of the Brooklyn Museum, Paul G. Howes of New Haven, Connecticut, Thomas Ring of Saginaw, Michigan, and Geoffrey O'Connell of Ithaca, New York.



With wings extended the albatross runs along the ground until it has headway enough to rise against the wind like an aëroplane

## THE ALBATROSSES OF LAYSAN<sup>1</sup>

By Homer R. Dill

Of the University of the State of Iowa

**H**UNDREDS of miles from the regular course of mail steamers, on a tiny sand-grit island in the middle of the Pacific Ocean, millions of birds have made their homes; here for countless generations they have lived, finding abundant food and suitable places in which to rear their young.

This primitive world, inhabited only by birds, is known as Laysan Island and is one of the Hawaiian group. The island has an area of two square miles, is low and flat, and although of volcanic origin has its upper surface to-day completely covered with coral sand and phosphate rock. The shores are of cream-white sand; the higher ground bordering the beach is covered with a rich growth of low bushes and sand grasses, among which are trailing vines. In the center lies a shallow lagoon unconnected with the sea and not far from the south end of the lagoon is a small fresh-water pond. From the central plane the sloping sides of the old coral atoll basin are plainly visible, rising gently to the higher ground that borders the beach.

In the spring of 1911 I spent six weeks on this island with three assistants, to study local conditions. We found twenty-three species of birds living there, among them the Laysan albatross (*Diomedea immutabilis*) perhaps the most notable.

The birds did not seem to mind the presence of man; as our party toiled up the beach through the loose coral sand these beautiful creatures were

<sup>1</sup> Illustrations from photographs by the Author



PORTION OF A LAYSAN ALBATROSS ROOKERY

Laysan, an island of the Hawaiian group and part of the Hawaiian Island Reservation, is inhabited only by birds. The albatross colony numbers

about 180,000

186



seen on the higher ground, assembled in groups of twenty or more; as we drew nearer they came up to greet us, some of them bowing profoundly. They gathered about as we stopped to rest, pulling at our clothing with their mandibles, and pecking at our luggage. If we offered to touch them they retreated somewhat, but soon returned, their curiosity getting the better of them. In flight the albatross, like an *aéroplane*, must rise against the wind; with its wings fully extended the bird runs swiftly along the ground until it has gained headway enough to rise. If thrown into the air it cannot fly as do most birds, but instead falls heavily to the ground.

About two years previous to our visit a party of foreign plume-hunters landed on Laysan and for several months made the slaughter of sea birds a business. Had they not been interrupted, they probably would have exterminated the entire colony. As it was, thousands of sea birds were destroyed, especially albatrosses. To-day there is about one-sixth of the original albatross colony left, numbering approximately 180,000 — and to one who has never beheld such masses of birds, this colony is a wonderful sight. The level ground that surrounds the lagoon is wholly occupied by them; also nearly every other part of the island, except the beaches, supports small colonies.

The amount of guano deposited by the albatrosses and other sea birds on this island has been estimated to be about one hundred tons daily. The guano deposits were leased for a number of years to a company in Honolulu but later the business was abandoned. A member of the company reports that although there is an abundant supply of guano it is of low grade, owing to the frequent rains that remove the ammonia.

Much of the time of the Laysan albatross is spent in carrying out a very strange performance. This performance varies, but usually goes on in the following order: One bird approaches another with an indescribable squeaking sound, bowing all the time. If the other bird feels like performing, which is usually the case, he bows in return. They cross bills rapidly several times. Then one bird turns his head and lifts one wing in such a manner that the primaries point directly out at the side. In the meantime the other bird keeps up a loud noise that sounds like the neighing of a horse. The bird taking the lead then walks around his partner, stepping high like a negro cake-walker. This part of the procedure is usually closed by one or both birds pointing their beaks straight up in the air while rising on their toes, puffing out their breasts and uttering a long-drawn groan. The same thing is repeated many times with slight variations.

The albatrosses are said to begin nesting about the middle of November. The one egg is laid on the ground, and the parent bird draws the sand or earth about her, forming a platter-like nest, in which the young albatross, when hatched, spends the early part of its life; in fact it does not stray far away even after it is able to walk about. I carried one of the youngsters



They walk about each other, stepping high like negro cake-walkers and bowing all the time



They cross bills rapidly several times. The first stage in the strange "dance" of the Laysan albatross



Second stage in "dance" — One bird quickly turns its head while lifting one wing; the other bird in the meantime snaps its bill



Neighing like a horse. The albatross "dance" is repeated over and over again with slight variations



The final stage in which each bird points its beak straight up in air while rising on its toes, puffing out its breast and uttering a long-drawn groan



Laysan albatrosses are not afraid of man. They approach a visitor on the island as if to greet him, bowing profoundly



Young albatrosses totter along fanning their wings in a futile attempt to fly



Black albatross about to feed young. The food consists of squid partially digested by the parent

to see the youngsters tottering along and fanning their wings in a futile attempt at flight. They play and quarrel with one another and amuse themselves by gathering together any loose material that may be near the nest. One young bird had surrounded itself with a pile of the bleached bones of its dead ancestors.

The black-footed albatross (*Diomedea nigripes*) has taken almost complete possession along the beaches on the north, east and south sides of the island. An occasional pair may be found nesting with the white species, but as a rule they are found by themselves.

The black-footed albatross is somewhat larger than the white species, and when seen on the

some distance from its nest to see if it would find its way back; after it had recovered from its fit of anger at being disturbed, it slowly waddled home. During the morning hours, the old birds feed the young, the food consisting entirely of squid that have been partly digested by the parent.

The young albatross was wearing a coat of dark brown down when we landed on the island [about April 24] which gave way a few weeks later to the white feathers on the breast and abdomen and the dark feathers of the back and wings. When the down has nearly disappeared the young bird begins to try its strength by spreading the wings and rising on its feet like the adult birds. It is laughable



Black albatross singing



The black albatrosses occupy the beaches of Laysan. This species also has a "dance," more elaborate than that of the white albatross and at a slower pace. The notes are soft and the dance ends with a sound like the stroke of a bell under water

wing is instantly recognized as being far superior as an aviator. Black albatrosses followed our ship all the way from the Hawaiian Islands to San Francisco. They nest like the white species and feed their young in the same manner. Also they have a performance similar to that of the white species, but much more elaborate and they go through the figures more slowly and gracefully. Instead of lifting one wing they raise both, while the notes uttered are much softer and the whole ends with a sound like the stroke of a bell under water or deep within the bird's body. Black albatrosses are very neighborly with the white species. We often saw them visiting a white colony and on a few occasions trying to perform with them, but the rapid pace set by the white bird was rather too much for his more deliberate cousin, and in each instance the affair ended disastrously.

During the latter part of August, young albatrosses are strong enough to fly and to feed themselves; all then leave the island and live on the sea until their return for the nesting season. It is a satisfaction in these days when all wild life is fast disappearing to know that there is in the middle of the Pacific this bird wilderness quite unmolested by man.

# OPENING OF THE HALL OF PUBLIC HEALTH

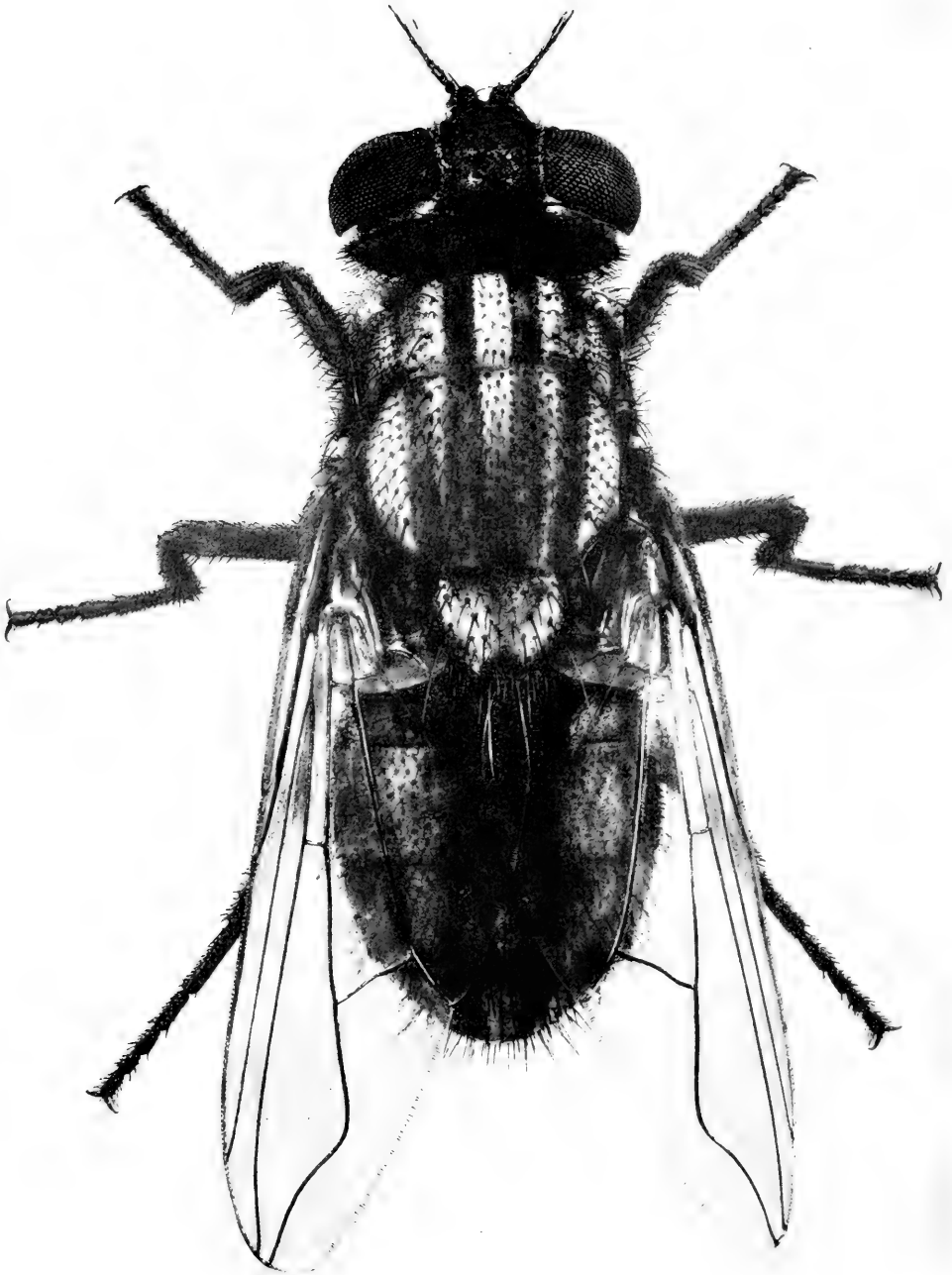
[*Report by the department*]

The exhibits of the department of public health which were sent to the International Congress of Hygiene and Demography in Washington last fall, through the generosity of Mr. Felix M. Warburg, dealt with the problems of water supply and waste disposal and with the bacteria. After their return from the Congress, where they were awarded the highest honor in both sections of the exhibit in which they were included, these models were installed in permanent fashion in the west corridor on the third floor. During the past year the department has been at work on the preparation of material bearing on the problems of insect-borne disease; and the completion of half a dozen of these exhibits and in particular of the model described in the daily press as "the house fly<sup>1</sup> as big as a cat" was selected as an auspicious occasion for the formal opening of the new hall of public health. In view of the fact that the movement for cleaning the city inaugurated by Health Commissioner Lederle this spring is largely based upon the danger to health from insect-carriers of disease, it was felt that our exhibition might be made of assistance in this important public work. The friends of the Museum were therefore invited on the evening of Wednesday, April sixteenth, to take part in a public meeting in the interest of the campaign for civic cleanliness instituted by the New York City department of health as well as to assist at the opening of the hall of public health.

The large lecture hall was well filled and on the platform besides Dr. Henry Fairfield Osborn, president of the Museum, and Dr. Frederic A. Lucas, director, the Museum was represented by Dr. Walter B. James and Mr. Felix M. Warburg of the board of trustees. With them sat Dr. Livingstone Farrand, secretary of the American Public Health Association, Mr. H. deB. Parsons of the Metropolitan Sewerage Commission, Dr. C. Ward Crampton, director of physical training of the department of education, Prof. Charles Baskerville of the College of the City of New York and Dr. N. E. Ditman of the American Museum of Safety.

<sup>1</sup> The first step in constructing the model was the study of the fly itself. It was found necessary to make the studies upon living flies stupefied with chloroform, or from freshly killed specimens since within half an hour after death much of the original color of the fly as well as the surface modeling changes. The chitinous armor is distorted either through the contraction of soft parts or the collapse of the air-tubes or tracheæ, while the limbs are drawn up into unnatural positions. Even the color of the eye changes a short time after death. Hence each specimen is useful only for a short time. About two hundred flies were used as models for the preliminary studies and as guides during the work of construction. Careful drawings enlarged to scale were made by Mr. Matausch of all anatomical details and these are on file in the Museum to vouch for the accuracy of the work. The head, mouth parts, body and legs were modeled separately in clay, cast in wax, smoothly finished and polished and accurately colored. The construction of the compound eyes was a problem in itself. Each one contains more than twelve hundred separate little eyes or ocelli. These are so arranged that they stand in perfect rows, when looked at from any one of three directions. In the model each eye is a separate glass bead, accurately placed in its proper position.

The most difficult and trying process was the construction and insertion of the hairs with which the body is covered. Since there are several kinds of hair on the fly varying in size, shape, and direction of insertion, and since these bend in characteristic positions often of importance to the economy of the fly, it was a serious matter to portray them accurately. This was finally accomplished by constructing each hair separately of german silver wire, filing it to its proper shape, bending it according to its peculiar character, and placing it carefully in its proper position. The wings were modeled in celluloid. The halteres (a rudimentary second pair of wings) the plumelike antennæ, the club-shaped palps or tasting organs were all accurately modeled and articulated into position. The fly is mounted on a base representing a magnified rectangular crumb of bread. [*Notes by Mr. R. W. Miner of the department of invertebrate zoölogy.*]



A MODEL OF THE HOUSE FLY

This model, fifteen inches in length and 64,000 times the size of the living fly, is the product of nearly one year's work by Mr. Ignaz Matusch, preparator. It is doubtless the most accurate and adequate representation of the external anatomy of the common house fly (*Musca domestica*) in existence, for not only have the more striking features been faithfully copied, but even the lesser details visible upon a magnification of forty diameters have been modeled with the utmost accuracy



President Osborn presided and spoke as follows:

"This evening we enter into the campaign to clean up the homes of six million people. Has it ever occurred to you that among other inventions, man is the inventor of dirt? In the whole of God's universe, before man defiled it, there was not a speck of dirt; everything was spotlessly clean. Go into the wilds anywhere, into the great deserts or in the great swamps, it is always the same. In the economy of Nature wherever there is a temporary deposit of what might be classed as dirt, like a decaying carcass or a pile of excrement, there is an army of scavengers — either bacteria or beasts of prey — and a complete clean-up in an incredibly short space of time.

In Nature, therefore, we find the prophets and harbingers of Commissioner Lederle, of Commissioner Edwards, of Mrs. Hewitt and others who are marshalling this great movement.

The part the Museum can play is to furnish visual teaching, first, of the perfect way in which Nature does it, and second, of the clumsy way in which man does it. The contrast is really between the work of God and the work of man, and it is certain that in the advance of civilization the more close we get to Nature's laws and example the more civilized we shall be.

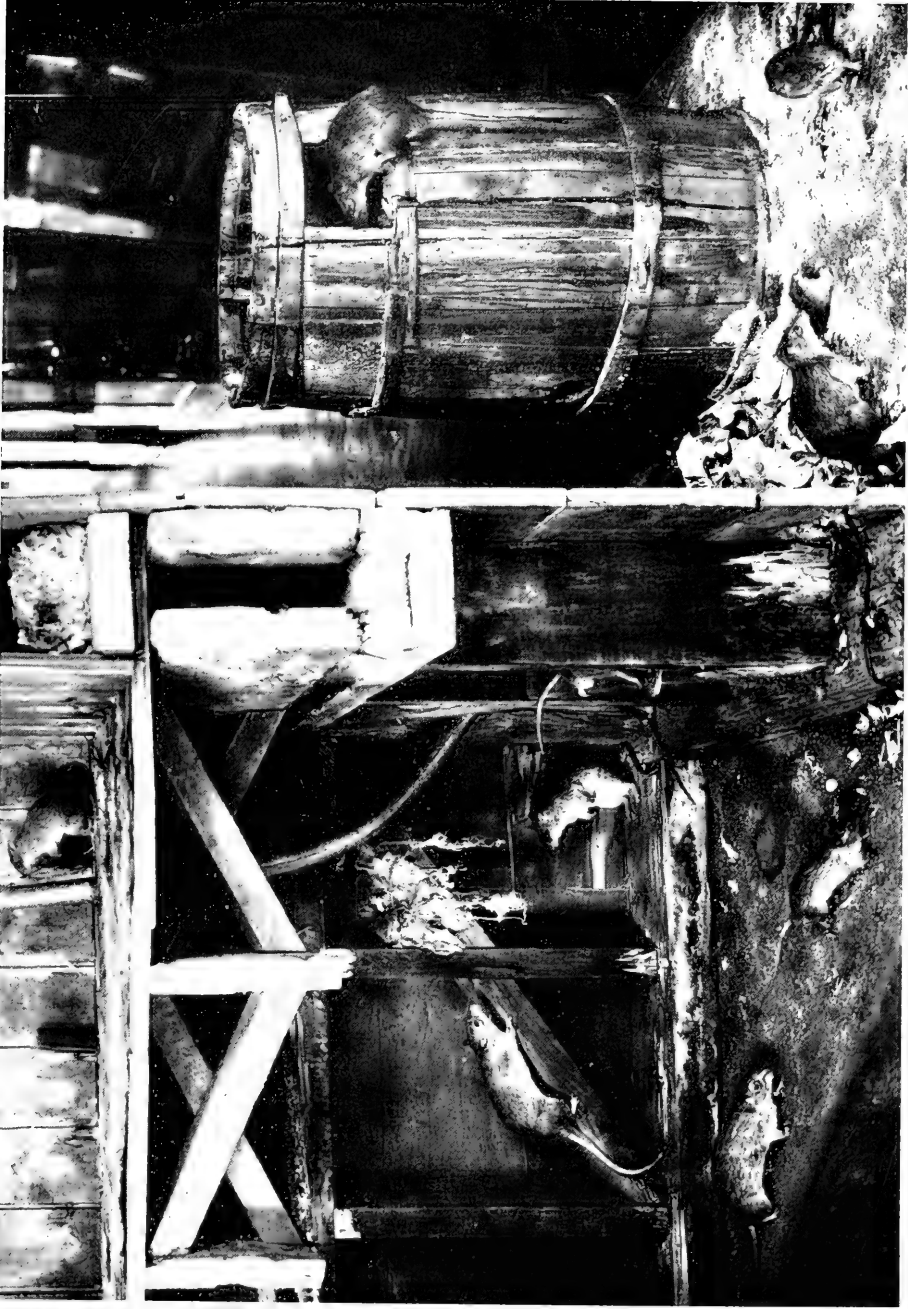
In the hall of public health which opens to the public for the first time this evening, you will find the first attempt made in a pure natural history museum to regard man as after all one of the most important animals.

It is curious how long it takes man to treat his fellow-man as well as he treats his animals. It is true we have societies for the prevention of cruelty to children, child-beating, neglect, but there are more subtle forms of cruelty to children and to grown people as well, which we are just beginning to understand and to guard against. It is cruel to bring a child into the world predestined to disease and suffering, hence eugenics. It is cruel to bring into our country the kind of people who will produce children like this, cruel, I mean, to those already here, hence the survey of immigration. It is cruel to bring up children in an unclean environment, hence this great clean city campaign.

As New York goes, so goes the nation in politics. It is also the case in civics. This great city, which is always decriing itself, and is too large to care for its outside critics, is also the center of the most intense local patriotism and public spirit; and to-night we are to see some of its best manifestations both among those who speak and those who support the movement by their presence here."

Dr. E. J. Lederle, health commissioner of the City of New York, then described the plans for the spring clean-up campaign and showed slides illustrating the bad conditions which exist and the forces of the city available for dealing with them. Mrs. E. R. Hewitt, president of the Woman's Municipal League, in a witty speech, outlined the part which women should play in this and similar movements for civic cleanliness. Dr. C.-E. A. Winslow, curator of the Museum's department of public health, then briefly outlined the viewpoint of the Museum toward this movement, which is in fact a natural history experiment in the adaptation of habitat to the human animal. The following is quoted from his address:

"On this rocky island one of the crucial experiments of civilization is being made, an experiment requiring the unremitting effort and keenest intelligence for its successful conduct. Consider what would happen if the vigilance with which our comfort and safety is here guarded were relaxed for only a few days, how the forces of primitive nature would rush in and take possession. The wolves and bears are gone from Manhattan, but if our water and light failed, if our forces of civic cleanliness and order were paralyzed for a week, destructive hosts of vermin and scourges of plague and pestilence would sweep in. Grass growing in the streets has long been a



A NEW MODEL IN THE DEPARTMENT OF PUBLIC HEALTH

Copied from an original in the possession of the United States Public Health Service of a corner of a kitchen and cellar in California where rats, hosts of the germs of bubonic, had taken almost complete possession of the premises. Another model in the exhibition, shows a house and barn protected by approved rat-proof construction

symbol of the desolation of a city and the struggle that is going on in the wake of the western floods to prevent epidemics more fatal than the floods themselves is a fresh reminder that it is no easy task to hold what we have won.

The movement for civic cleanliness in which we have the privilege of taking a small part to-night, is an attempt to make it more certain that the slice of the world's surface that we call New York shall be a place fitted for the higher life of man and not for the lower life of vermin and microbe. Garbage and rubbish in cellars and streets and lots make the city a home for rats and flies. Undrained marshes and stagnant pools of water make it a home for mosquitoes and malarial germs. Improper care of human wastes and foul harbor waters make it a home for the typhoid bacillus. Clouds of irritant dust prepare congenial ground for the germs of tuberculosis and pneumonia. The removal of these things makes the city a home for civilized man.

We of the American Museum are proud that we can do our part in helping forward movements of this sort. The department of public health is one of the smallest departments of this Museum. It occupies about one per cent of the floor space allotted to exhibition halls. Yet in the mind of its curator this small beginning looms large with future possibilities. It is the thin point at which all the departments of the Museum touch the practical daily life of man. With the advice of the department of geology we have prepared maps and diagrams showing the relations of rainfall and rock formations to public water supply. A preparator skilled in the service of the department of mammalogy has made for us a group of rats which are important as the carriers of bubonic plague. Through generous expenditure of time and energy on the part of the department of invertebrate zoology we have been able to prepare models of the microorganisms of lakes and reservoirs and of some of the insects which carry disease.

It happens that the new exhibits for the first time formally displayed to-night deal with this last problem of insect-borne disease and are therefore particularly germane to the objects of Dr. Lederle's city cleaning movement. The models of the mosquito in the Darwin hall have for many years testified to the interest of the Museum in these practical problems of human welfare. The new material deals particularly with two other insect-carriers, the flea and the fly, and marks the beginning of a somewhat extensive plan for a comprehensive exhibit of insects in relation to disease. We have now installed a striking model copied from an original in the possession of the U. S. Public Health Service of a corner of a kitchen and cellar in California where rats, the hosts of the germ of plague, had taken almost complete possession of the premises; and as a companion we have a small model of a house and barn protected against vermin by approved rat-proof construction. We have small models showing how an ill-kept farm threatens the health by polluted water and the breeding of flies and mosquitoes and how all these conditions are remedied on a well-kept farm. We have a model showing how much more fatal were typhoid germs than bullets in the Spanish war of 1898. Finally we have an enlarged model of the house fly itself, one foot long, upon which the patience and study and artistic skill of Mr. I. Matausch have been constantly employed for over nine months."

After the speaking a remarkable moving picture film was shown illustrating the life history and habits of the fly. This was kindly loaned for the occasion by Mr. Edward Hatch, Jr., chairman of the Fly-fighting Committee of the Merchant's Association.

The exhibits so far installed include only the beginning of the contemplated section dealing with the relation between insects and disease and the department of public health plans to continue during the coming summer the preparation of exhibits dealing in particular with the fly.

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Patron*, HON. CHARLES SMETS;

*Sustaining Member*, MR. H. C. FAHNESTOCK;

*Life Members*, MRS. WILLIAM G. NICHOLS, MRS. M. ROBERTSON, MRS. WILLIAM SLOANE; HIS EXCELLENCY, J. MALFEYT, and MESSRS. ALBERT H. BALDWIN, ALFRED DEJONGE, and GEORGE EASTMAN;

*Annual Members*, MRS. A. J. BLOOMBERG, MRS. J. B. EDSON, MRS. AUGUST LEWIS, MRS. JULIUS LOEWENTHAL, MRS. EUGENE MEYER, JR., MRS. JAMES E. POPE, MRS. OSCAR ROSENTHAL, MRS. EMILY M. SCOTT, MRS. THEODORE THOMAS, MISS EVA R. INGERSOLL BROWN, DR. HARRY R. SALOMON, PROF. EDMUND B. WILSON and MESSRS. GEORGE B. BERNHEIM, HENRY S. BRILL, WILLIAM W. COHEN, NICHOLAS EVERTSON CROSBY, HENRY DUCHARDT, NATHAN FLEISCHER, HERBERT FRANKEL, HENRY E. FRANKENBERG, CHARLES A. GOULD, JOHN M. W. HICKS, JONAS LIE, HUGO V. LOEWI, CHARLES L. LOOP, CHARLES W. MCCUTCHEEN, FRED. A. MACK, EDWARD F. MC MANUS, FRANK H. MAIN, JOHN PALMER, P. STUYVESANT PILLOT, FRED. L. REIS, MYRON W. ROBINSON, C. P. SCHLICKE, WALTER SCOTT, GERALD SHERMAN, EUGENE E. SPIEGELBERG, DUNCAN STERLING, JOSEPH TATE and R. B. VAN DYKE.

MR. JOHN BORDEN of Chicago, who is planning a hunting trip in the Arctic for big game and has built for the purpose an especially designed schooner yacht, will endeavor to secure for the Museum the skeleton of a bowhead whale. With this in view, he has invited Mr. Roy C. Andrews of the Museum to accompany him upon the cruise. The party will leave San Francisco about the first of July upon the yacht which is now on her way around the Horn. Besides making especial efforts to kill a bowhead whale, the members of the party will spend considerable time in hunting brown and polar bear, walrus and caribou. The whale if secured will be towed to the nearest harbor and Mr. Andrews will be landed to prepare the skeleton, which will be sent to Seattle by coasting schooner for shipment to New York. Mr. Borden's yacht carries a fully equipped New Bedford whaleboat, and is captained by Mr. Charles Sparks, an experienced whaleman from Provincetown.

The Museum is especially to be congratulated upon the opportunity which Mr. Borden has presented to acquire the skeleton of this whale. Because of the great expense attendant upon securing a specimen, since this species has a high commercial value, its acquisition had seemed impossible. This one species alone is needed to complete the Museum's collection of large cetaceans. There are at present no bowhead skeletons in America and but little scientific data is known as to the external anatomy. Through Mr. Borden's generosity moreover it may be possible to exhibit in the proposed new whale hall of the Museum not only the complete skeleton, but also a life-size model of this remarkable animal.

DURING the month of May there will be on exhibition in the west assembly hall and adjoining corridor a series of paintings of Alaskan scenes by Leonard M. Davis, some of the results of many years' residence in Alaska. The series comprises more than a score of large canvases and about one hundred small studies — snow-clad mountains, gorgeous sunsets, brilliant auroras, flower-clad hillsides, displaying the wealth of color that makes the northland a continual surprise to those who think of it as always bleak.

THE State of Arkansas has long been noted for the unusually fine class of stone implements found in the mounds and ancient village sites occurring in that region.

The Museum has been fortunate enough to receive through Mr. Joseph M. Bell a fine example of the best class of stone work plowed out in a field one-half mile east of Bassett, Mississippi County, Arkansas. The implement is one of the so-called ceremonial celts and has received a very high polish. It is an unusual form, the use of which is problematic.

THROUGH the bequest of the late Edward Russ, a life member, the Museum has received one thousand dollars.

THE MUSEUM is designated as one of ten residuary legatees under the will of the late Morris Loeb. According to the terms of the bequest it must be used for the illustration of the industrial use of natural products in ancient and modern times.

MISS MARY CYNTHIA DICKERSON has been promoted from assistant curator to associate curator in the department of ichthyology and herpetology, this appointment taking effect May 1, 1913.

THE material collected by the third African expedition, under Dr. W. S. Rainsford, has been received at the Museum. It contains specimens of black rhinoceros, East African buffalo, eland, leopard, cheetah, antelope and monkey.

PROFESSOR T. T. WATERMAN, assistant professor of anthropology in the University of California will spend the summer in New York, in part to study the collections in the American Museum.

THE MUSEUM series of cave paintings has been extended by a series from the caves of South Africa. On the end wall of the African hall are four panels presenting the best known examples of Bushmen art. These are not of great antiquity but seem to belong to a state of culture somewhat analogous to that of the cave men of Europe. The most interesting panel is that representing a running fight between a party of Bushmen cattle thieves and a pursuing posse of Kaffirs.

MR. MAX SCHRABISCH has brought his rock-shelter collections and reports to the Museum for the season of 1912-13. Seven sites were explored. The most important was one near Stony Point, New York. This proved to be a large granite boulder under the shelter of which the Indians camped. The ancient fireplaces were uncovered and several refuse pits filled with bones of the animals used for food.

MR. A. J. MUTCHLER has been appointed assistant in the department of invertebrate zoölogy, this appointment taking effect May 1, 1913.

THE collection of local birds is once more open to the public after having been retired for some months on account of its removal to new quarters and the installation of the exhibits of the department of public health on the third floor. The local birds may now be found in the west corridor, second floor.

THE California gray whale (*Rhachianectes glaucus*) which Mr. Roy C. Andrews secured on his last cruise was the subject of an interesting communication by him to the May meeting of the Section of Biology, New York Academy of Sciences. He showed that in many points of its skeleton *Rhachianectes* is the most primitive living whalebone whale and that it is probably the little-changed descendant of the early

Tertiary ancestral stock which also gave rise both to the Balænopteridæ (fin whales) and to the Balenidæ (right whales).

THE department of ichthyology and herpetology has just received through exchange from the Queensland Museum, Brisbane, Australia, an interesting series of specimens of fishes and reptiles from the Australian region.

AT Rancho La Brea near Los Angeles, California, is a series of ancient asphalt pools covering many acres, which contain thousands of skeletons of a great variety of extinct animals of the Pleistocene epoch. Ground sloths, sabre-tooths, extinct species of wolves and many other animals are heaped together in amazing profusion. To the Section of Biology, New York Academy of Sciences, Dr. Matthew recently described his visit to Rancho La Brea, touching especially on its probable origin, and on the way in which the remains of the entrapped animals had been dissociated and intermingled. He also exhibited some of the fossils from this formation which had been secured in exchange from the University of California through the coöperation of Professor J. C. Merriam.

THE cover of this number of the JOURNAL is designed from objects of antiquity and historic value in the Morgan gem collection. Babylonian cylinders dating from 4000 to 400 B. C. are combined in the border, an enlargement of a portion of a fifteenth century turquoise inscribed with two thousand words of the Koran forms the inner band, and an agate axhammer of ancient workmanship occupies the lower left-hand corner. The cylinders are engraved with figures and names on various minerals such as lapis-lazuli, jasper, chalcedony, steatite, hematite and agate. The axhammer of banded agate was in the possession of Cardinal Borgia while at the head of the Propoganda, was acquired from the Countess Ettore Borgia by Count Michael Tyskiewiez for 15,000 francs (\$3000) and purchased by Tiffany and Company soon after his death. It found its way into the Museum's gem collection through the generosity of Mr. Morgan.

THE Berlin Museum has for some years past conducted explorations in the dinosaur beds of German East Africa. These explorations, financed upon a far more liberal scale than those of American museums, have secured splendid collections of dinosaurs from that region. While the preparation and study of these collections will doubtless take some time to complete, the preliminary reports which have been published indicate that they will equal or surpass anything that has been found in this country. The largest of these East African dinosaurs, distinguished by an extraordinary length of neck and fore limb, is probably related to the imperfectly known *Brachiosaurus* of this country and much exceeds the *Brontosaurus* or *Diplodocus* in the size of these parts. With this were found partial or nearly complete skeletons of numerous smaller dinosaurs, and various other remains. Three successive faunæ have been distinguished by the German geologists, and it is hoped that much may be learned as to the evolution of these extraordinary reptiles.

The total cost of the expedition is stated at 180,000 marks (\$45,000) up to 1912, most of which was raised by private subscription. An additional sum of 50,000 marks has since been voted by the Prussian government. This liberal support attests the widespread interest in scientific progress displayed by the German people and in particular their interest in these records of the past history of the world. Yet as Dr. Edward Hennig, from whose description [*Am Tendaguru*, Schweizerbart'sche Verlagsbuchhandlung: Stuttgart, 1912] the above facts are mainly taken, remarks, the amount is small in comparison with the cost of say the German Antarctic expedition for which 1,500,000 marks were subscribed.

# The American Museum Journal

VOL. XIII

MAY, 1913

No. 5

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MARY CYNTHIA DICKERSON, *Editor*

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**The Journal is sent free to all members of the Museum.**



PROFESSOR ALBERT S. BICKMORE  
CURATOR EMERITUS OF THE DEPARTMENT OF PUBLIC EDUCATION

Bronze by William Couper made in 1909 from portrait studies of Professor Bickmore and recently moved from the members' room to the east wall at the entrance to the auditorium [See page 238]



## OUR NATIONAL BIRD RESERVATIONS

PROTECTED NESTING PLACES, RESTING AND FEEDING GROUNDS FOR BIRDS ON LONG MIGRATIONS—FIELD LABORATORIES FOR EXPERIMENTAL WORK ON IMPORTANT ECONOMIC AND SCIENTIFIC PROBLEMS

By T. S. Palmer

Assistant Chief, United States Biological Survey

WHEN President Roosevelt signed the Executive Order setting aside Pelican Island in Florida as a reservation, he took a step which was destined to mark an important milestone in the progress of bird protection. The colony of brown pelicans nesting on this island had been known to ornithologists for more than a century, and ever since the visit of Dr. Henry Bryant in 1858 it had been visited from time to time by observers who had published notes on the condition of birds. The visits of Mr. Frank M. Chapman in 1898 and 1900 and the wonderful series of photographs which he obtained showed very clearly the urgent necessity for the protection of the birds.

Late in April, 1901, at the request of Mr. William Dutcher, then chairman of the Committee on Protection of Birds of the American Ornithologists' Union, I accompanied him to Tallahassee, Florida, in an effort to secure the enactment of a law for the protection of these and other non-game birds. The effort met with success and under the act approved May 29, 1901, protection was extended to practically all non-game birds in the state. In the following year a warden was appointed by the committee and placed in charge of Pelican Island. Later the island was surveyed and negotiations were begun for its purchase, when it was suggested by the Surveyor General of the United States that it might be made a national reservation. Acting on this suggestion an Executive Order was prepared in the General Land Office, approved by the Secretary of the Interior, and submitted to the President. This Executive Order, the first ever issued for the benefit of birds, read as follows:

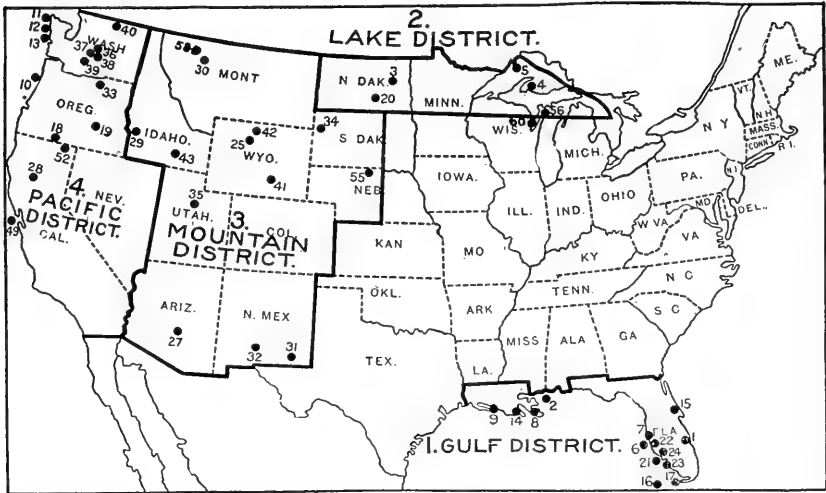
WHITE HOUSE, March 14, 1903

It is hereby ordered that Pelican Island in Indian River in section nine, township thirty-one south, range thirty-nine east, State of Florida, be, and it is hereby, reserved and set apart for the use of the Department of Agriculture as a preserve and breeding ground for native birds.

[Signed]

THEODORE ROOSEVELT

Such briefly was the history of the creation of the first national bird reservation in the United States. In the ten years which have since elapsed many other islands and pieces of public land have been dedicated to the



Location of national bird reservations and administration districts. From Circular 87, Biological Survey, United States Department of Agriculture

birds until the number of reservations has increased from one to sixty-one, but Pelican Island still remains the best known and one of the most accessible.

### LOCATION OF THE RESERVATIONS

National bird reservations are widely scattered in nineteen states and territories, from Florida and Porto Rico in the south to Michigan, Montana, Washington and Alaska in the north and the Aleutian Islands and Hawaii in the west. Between Chamisso Island in Alaska and Culebra Island, Porto Rico, is a distance of nearly 50 degrees of latitude, and between Attu, the most distant of the Aleutian Islands and Culebra is a distance of more than 120 degrees of longitude. In other words, the most remote reservations are separated by a space equal to one-third the distance around the world from north to south and from west to east, and in visiting them a traveler must journey farther than in going from New York to Mombasa, British East Africa, or from London eastward to Manila.

In the following lists the reservations are arranged both chronologically and alphabetically to facilitate reference:

LIST OF NATIONAL BIRD RESERVATIONS MARCH 4, 1913, ARRANGED IN CHRONOLOGICAL ORDER

[Areas unknown, except as follows: Pelican Island 5.50, Stump Lake 27.39, Passage Key 36.37, and Indian Key 90 acres.]

No.	Name	Date established	Executive order No.	No.	Name	Date established	Executive order No.
1	Pelican Island, Fla.	Mar. 14, 1903	} 1014	32	Rio Grande, N. Mex.	do.	1032
2	Breton Island, La.	Jan. 26, 1909		33	Cold Springs, Oreg.	do.	1032
3	Stump Lake, N. Dak.	Oct. 4, 1904		34	Belle Fourche, S. Dak.	do.	1032
4	Huron Islands, Mich.	Mar. 9, 1905		35	Strawberry Valley, Utah	do.	1032
5	Siskiwit Islands, Mich.	do.		36	Keechelus, Wash.	do.	1032
6	Passage Key, Fla.	do.	37	Kachess, Wash.	do.	1032	
7	Indian Key, Fla.	Feb. 10, 1906	38	Clealum, Wash.	do.	1032	
8	Tern Islands, La.	Aug. 8, 1907	39	Bumping Lake, Wash.	do.	1032	
9	Shell Keys, La.	Aug. 17, 1907	40	Conconully, Wash.	do.	1032	
10	Three Arch Rocks, Oreg.	Oct. 14, 1907	699	41	Pathfinder, Wyo.	do.	1032
11	Flattery Rocks, Wash.	Oct. 23, 1907	703	42	Shoshone, Wyo.	do.	1032
12	Quillayute Needles, Wash.	do.	705	43	Minidoka, Idaho	do.	1032
13	Copalis Rock, Wash.	do.	704	44	Bering Sea, Alaska	Feb. 21, 1912	1486
14	East Timbalier, La.	Dec. 7, 1907	718	45	Tuxedni, Alaska	Feb. 27, 1909	1037
15	Mosquito Inlet, Fla.	Feb. 24, 1908	763	46	St. Lazaria, Alaska	do.	1039
16	Tortugas Keys, Fla.	Apr. 2, 1909	1057	47	Yukon Delta, Alaska	do.	1040
17	Key West, Fla.	Apr. 6, 1908	779	48	Culebra, P. R.	do.	1041
18	Klamath Lake, Oreg.	Aug. 8, 1908	923	49	Farallon, Cal.	do.	1042
19	Lake Malheur, Oreg.	do.	924	50	Pribilof, Alaska	do.	1043
20	Chase Lake, N. Dak.	Aug. 18, 1908	929	51	Bogoslof, Alaska	do.	1044
21	Pine Island, Fla.	Aug. 28, 1908	939	52	Clear Lake, Cal.	Mar. 2, 1909	1049
22	Palma Sola, Fla.	Sept. 15, 1908	942	53	Forrester Island, Alaska	Apr. 11, 1911	1332
23	Matlacha Pass, Fla.	Sept. 26, 1908	943	54	Clear Lake, Cal.	Jan. 13, 1912	1464
24	Island Bay, Fla.	do.	945	55	Hazy Islands, Alaska	do.	1458
25	Loch-Katrine, Wyo.	Oct. 23, 1908	958	56	Niobrara, Nebr.	do.	1459
26	Hawaiian Islands, Hawaii	Oct. 26, 1908	961	57	Green Bay, Wis.	Feb. 21, 1912	1461
27	Salt River, Ariz.	Feb. 3, 1909	1019	57	Chamisso Island, Alaska	Dec. 7, 1912	1487
28	East Park, Cal.	Feb. 25, 1909	1032	58	Pishkun, Mont.	Dec. 17, 1912	1653
29	Deer Flat, Idaho	Feb. 25, 1909	1032	59	Desecheo Island, P. R.	Dec. 19, 1912	1664
30	Willow Creek, Mont.	do.	1032	60	Gravel Island, Wis.	Jan. 9, 1913	1669
31	Carlsbad, N. Mex.	do.	1032	61	Aleutian Islands, Alaska	Mar. 3, 1913	1678

LIST OF NATIONAL BIRD RESERVATIONS MARCH 4, 1913, ARRANGED ALPHABETICALLY

Aleutian Islands Alaska	61	Forrester Island, Alaska	53	Pelican Island, Fla.	1
Belle Fourche, S. Dak.	34	Gravel Island, Wis.	60	Pine Island, Fla.	21
Bering Sea, Alaska	44	Green Bay, Wis.	56	Pishkun, Mont.	58
Bogoslof, Alaska	51	Hawaiian Islands, Hawaii	26	Pribilof, Alaska	50
Breton Island, La.	2	Hazy Islands, Alaska	54	Quillayute Needles, Wash.	12
Bumping Lake, Wash.	39	Huron Islands, Mich.	4	Rio Grande, N. Mex.	32
Carlsbad, N. Mex.	31	Indian Key, Fla.	7	St. Lazaria, Alaska	46
Chamisso Island, Alaska	57	Island Bay, Fla.	24	Salt River, Ariz.	27
Chase Lake, N. Dak.	20	Kachess, Wash.	37	Shell Keys, La.	9
Clealum, Wash.	38	Keechelus, Wash.	36	Shoshone, Wyo.	42
Clear Lake, Cal.	52	Key West, Fla.	17	Siskiwit, Mich.	5
Cold Springs, Oreg.	33	Klamath Lake, Oreg.	18	Strawberry Valley, Utah	35
Conconully, Wash.	40	Loch-Katrine, Wyo.	25	Stump Lake, N. Dak.	3
Copalis Rock, Wash.	13	Malheur Lake, Oreg.	19	Tern Islands, La.	8
Culebra, P. R.	48	Matlacha Pass, Fla.	23	Three Arch Rocks, Oreg.	10
Deer Flat, Idaho	29	Minidoka, Idaho	43	Tortugas Keys, Fla.	16
Desecheo Island, P. R.	59	Mosquito Inlet, Fla.	15	Tuxedni, Alaska	45
East Park, Cal.	28	Niobrara, Nebr.	55	Willow Creek, Mont.	30
East Timbalier, La.	14	Palma Sola, Fla.	22	Yukon Delta, Alaska	47
Farallon, Cal.	49	Passage Key, Fla.	6		
Flattery Rocks, Wash.	11	Pathfinder, Wyo.	41		

<sup>1</sup> Transferred to Bureau of Fisheries by act of Apr. 21, 1910.







#### WHITE PELICANS, KLAMATH LAKE

The white pelican has a wing expanse of eight or nine feet and is most impressive in the air. Photograph of portion of group in the American Museum, representing white pelicans, Caspian terns and cormorants. Klamath Lake, which is on the boundary of California and Oregon, was made a national reservation on August 8, 1908

Another type of reservation is the refuge established on the reclamation projects in the west. It comprises merely a narrow strip of land bordering the reservoir and is set aside to afford the birds a resting place on their journeys north and south. Some of these reservations were created before construction work was completed and before there was any water to attract the birds, in order to afford protection as soon as the reservoirs were filled and the birds began to visit them. One-third of all the reservations belong in this class.

While in most cases the refuges are isolated and some of them very difficult to visit, others, like Pelican Island and Mosquito Inlet, Florida, are readily accessible. The Deer Flat Reservation in Idaho seems destined to become something of a resort for the people of Boise and Nampa on account of the facilities for boating on the reservoir, and since the Niobrara Reservation, three miles from Valentine, Nebraska, has been stocked with a herd of big game, it attracts many visitors. On Forrester Island, Alaska, during the summer, is a camp of more than two hundred fishermen of various nationalities, and on the recently established Aleutian Reservation are two important settlements, Dutch Harbor and Unalaska, and several small villages of natives.

#### KINDS OF BIRDS PROTECTED

The birds which have been provided with homesteads by the National Government are chiefly marsh birds or waterfowl which nest in colonies. On the refuges in the Gulf District they comprise laughing gulls, terns of several kinds, brown pelicans, Florida cormorants, and several species of herons. On the reservations on the Great Lakes the herring gull is the principal species. On the interior lakes of Oregon are numbers of Canada geese, Caspian terns, California gulls, white pelicans and western grebes. These lakes formerly furnished many grebe skins for the millinery trade before they were protected by Executive Order. On the islands off the coast of California, Oregon and Washington, are found such birds as the western gull, the ashy, forked-tailed, and Kæding's petrels, the tufted puffin, Cassin's auklet, the remarkable rhinoceros auklet, pigeon and California guillemots, Baird's, Brandt's and Farallon cormorants. On the Alaska islands are colonies of Arctic sea birds, such as auklets, petrels, puffins and northern gulls. The Yukon Delta Reservation is one of the greatest breeding grounds for ducks and geese, including that of the rare Emperor goose. On the Hawaiian Island Reservation<sup>1</sup> in the Mid-Pacific is Laysan Island, one of the most famous bird colonies in the world where

<sup>1</sup> Many papers on the bird fauna of the reservations have been published and readers who may wish to consult them will find the titles and references in Circular 87 of the Biological Survey, entitled "Reservations for the Protection of Wild Life" (pp. 22-29).



Field study of Caspian terns at Klamath Lake. Photograph by Mr. Frank M. Chapman



Cormorant rocks off California coast near Monterey. Typical of bird life on various rocky islands along the Pacific coast such as Farallon Island which was made a national reservation in 1909. Photograph by Mr. Frank M. Chapman





BRANDT'S CORMORANT, CALIFORNIA COAST

Photograph of portion of habitat bird group in the American Museum, showing conditions such as are to be seen on Farallon Island. Other groups in the Museum giving studies of bird life such as may be seen on national reservations are as follows: brown pelican, white pelican, the western grebe, bird rock, Cobbs Island and the heron groups



Pelican Island, Florida. From the painting by Bruce Horsfal, background of the brown pelican group in the American Museum. Pelican Island, the first national bird reservation, was set aside in March, 1903, by order of President Roosevelt. It is guarded by a warden employed by the National Association of Audubon Societies. Only visitors who have secured a permit from this warden are allowed to land on the island

albatrosses, shearwaters, frigate birds, noddy and sooty terns, and the beautiful snow-white Pacific tern resort to breed. Here are also found resident throughout the year the peculiar Laysan rail, the Laysan teal, the Laysan finch, and the Miller bird.

#### HOW THE BIRDS ARE PROTECTED

In many cases the chief protection to the birds lies in the isolation of the reservation. The islands on the Washington coast and the Farallon Reservation are very difficult to land on even when the sea is smooth, and in rough weather are practically inaccessible. On the larger and more accessible reservations wardens are stationed throughout the year or at least during the season when the birds are breeding. In several cases, chiefly through the coöperation of the National Association of Audubon Societies, motor boats are provided for the use of the wardens in patrolling the waters about the islands. To protect the birds on Bird Key in the Dry Tortugas, recourse is had to the Navy Department which several times each year sends a Naval tug from Key West to the reservation to transport the warden and his supplies. In the case of the Hawaiian Reservation a revenue cutter is now despatched from Honolulu at least once each year and sometimes oftener, to make the round of the islands and ascertain whether the birds have been disturbed. In 1909 a company of twenty-three Japanese plumage-hunters visited Laysan and Laysianski and destroyed



nearly 300,000 birds. They were arrested by the officers of the revenue cutter, brought back to Honolulu, tried and deported to Japan and the plumage was confiscated. Since this practical demonstration in bird protection the colony has not been disturbed.

#### UTILIZATION OF THE RESERVATIONS

National refuges are utilized for several purposes other than the protection of birds, notably the preservation of other forms of wild life, the study of certain problems connected with the migration and life history of species, and the development of public sentiment in favor of wild life conservation. With the stopping of shooting on the Mosquito Inlet Reservation protection was afforded aquatic mammals, as well as birds, and since this order has been in effect manatees and porpoises have increased in the adjacent waters. Incidentally, it is interesting to note that Daytona at the upper end of the Mosquito Inlet Reservation is the most northern point at which the manatee occurs on the coast of Florida. On several of the Pacific Coast reservations sea lions are afforded protection and on some of the islands in the Hawaiian Reservation a rare and peculiar tropical seal is one of the most interesting species.

At the Deer Flat Reservation in Idaho experiments are being made to ascertain to what extent birds can be protected and encouraged to breed on a body of water which is used as a resort for visitors during summer. It is expected that with reasonable restrictions on the use of boats on the reservoir the birds will become as tame as they are at some of the winter resorts in Florida. At the Niobrara Reservation in Nebraska, which includes some 12,000 acres of land on the edge of the sand hills, within the former range of

the buffalo and the home of the prairie chicken and sharp-tailed grouse, an enclosure for big game has been constructed. Here has been established through the liberality of a public-spirited citizen of Nebraska a nucleus of a herd of buffalo, elk and deer, which in time will doubtless increase and stock a large part of the reservation.

At the Tortugas Reservation in extreme southern Florida some very interesting experiments are being conducted by Professor John B. Watson in coöperation with the Carnegie Institution. Professor Watson, who has acted as warden for several seasons, has been experimenting with the two species of terns which nest on the island to determine, if possible, the manner in which birds find their way during migration. He has also been studying some of the problems connected with the nesting habits of the birds. Several terns which were nesting on the island were marked for identification and sent northward on a steamer from Key West to New York. When off Cape Hatteras they were liberated and within a few days found their way back to their nests on the reservation. In order to show that this so-called "homing sense" was not fortuitous and not affected by the presence of the Gulf Stream, experiments will be made this season in taking the birds westward towards Galveston and setting them free at different points in the Gulf of Mexico some distance from the island. Professor Watson has also shown that the sooty tern is unable to pass the night on the water, indicating that although a sea bird it cannot venture far from land when on migration, whereas its neighbor, the noddy tern, apparently suffers no inconvenience when forced to rest on the water.

Many other questions in regard to food, time of nesting, period of incubation, methods of feeding, causes which check increase of the various species, and similar practical questions demand attention. These problems can best be solved where birds are nesting in large numbers and in working them out the reservations can be utilized as field laboratories for the increase of our knowledge as well as refuges for the birds.

# SHELL CAMEOS

By L. P. Gratacap

Illustrations from the Morgan gem collection

THE ancients were not acquainted with the artistic possibilities in the pictorial gravure of shells. The permanence of mineral matrices for their skill was readily apparent and the stimulation supplied by the difficulties of the work enhanced both the appreciation and the pleasure of cutter and engraver. Then too the variegated and "layered" agates, with their strong tones gave opportunities for effective contrast, while intaglios permitted keenness of outline and microscopic precision.

But any implied censure must be qualified by recalling that the conches of the West Indies, which furnish the most adaptable material and the best color for the engraver, were unknown to the Greeks and Romans, and that the shores of the Mediterranean offered rather worthless material from which neither experiment nor accident could have evolved the priceless "brooch of our grandmothers."

Shell-cameo art apparently arose during the sixteenth century, expanding as demand increased. Ambitious subjects, drawn from the fables of mythology or the biblical records, were attempted; portraiture and conventional scenes also employed the numerous artists who now welcomed this new resource which permitted beautiful adjustments of marble-white relievos over saffron, yellow, orange or faintly mahogany backgrounds. The shell structure with its superficial white layer coherent with a delicate underlying colored film was a very convenient reproduction of the zoned onyxes. The material too was softer to work, although its fragility deterred hasty or careless sculptors.

The helmet shells (*Cassis cornuta*, *C. tuberosa*, *C. cameo* [madagascariensis], *C. rufa*) furnished the most promising and the more generally employed material, but enthusiasm and curiosity brought into use other shells as *Turbo*, *Strombus*, *Meleagrina*, *Cypræa* and even the *Nautilus*. In none of these species however was there so useful or so permanent a disposition of the parts for artistic effects and the background was either quite absent or less adaptable for desired effects, thus the process of elimination has reduced the first miscellaneous selections to the helmet shells alone and of these *Cassis cameo* claims preëminence because of the very favorable color development of the under conchiolin layer. The big stromb (*Strombus gigas*) by reason of its deeply-tinted, roseate mouth was quickly appropriated and its coloring produced vivacious effects, but the color faded and exposure soon robbed the design of its beauty.

The tiger cowrie (*Cypræa tigris*) perhaps might be made to rival the black helmet, but its convexity and smallness deprives the artist of a broad field



SHELL CAMEO OF THE MORGAN GEM COLLECTION

Carving of Guido Reni's Aurora on a Madagascar helmet shell (*Cassis cameo*). Morgan gem collection

for enlarged composition. In the Seba collection a cameo representing the "Rape of Europa," cut by C. Bellekin, was formed over the surface of the pearly nautilus whereon the broad band (keel of the shell) separating the side subjects "consisted of an arabesque of flowers and leaves, ending on the narrowing convex curve as it turns under into the cuplike lip of the shell, in a bold heraldic design, all of which was carved in relief." An example of the cowrie cameo may be seen in the Mediæval room of the British Museum showing a winged centaur galloping and armed with club and shield.

The helmet shell practically monopolized attention in the shell cameo industry however; and selection played an important part in the first steps. But a small number in any lot of shells are fit to use. Dullness, weakness, turbidity, a speckled condition of the under layer, imperfect solidity of the upper layer which may be too porous or even worm-eaten, disqualify a shell for the artist's acceptance. Sometimes the back-color layer is too thin and fragile to guarantee the integrity of the finished carving. In such cases, when the color is good, the artist cuts out his design on the shell intact, trusting to the arched rigidity of the shell to maintain its continuity.

The rich coloring of the inner zone in the helmets naturally attains its depth and desirable tone near the mouth of the shell and from this portion selections are made for the plate. Undulating ridges (as in *Cassis cameo*) on the last whorl are thickened, and into this strengthened deposit deeper lines can be cut and a high relief obtained. Yellow or orange backgrounds are unusual, but present very inspiring contrasts.

The shell selected, the formal stages of executing the work begin. If a design as a *tour de force*, or too large for ornamental personal use is proposed, the shell frequently is treated as a whole. For most purposes, at least those connected with commerce, the shell is cut into pieces, by means of a tin wheel, running water and emery powder, a selection of the better-colored and textually perfect pieces made, and the various sections assigned to the subjects, as these subjects are best suited in size or treatment for the size or boldness of the physical features in the parts of the shell at hand.

In beginning his work, the artist prepares his surface much as the painter coats and smooths his canvas; discolorations, asperities of surface, minute imperfections are removed. The subject selected, the outline of the cameo — usually square, oval, or oblong with rounded angles — is shaped by means of a small grindstone turned over a trough of water, the process or action of grinding being safer than sawing, as the shell, freed from the reinforcement of its original position, may now easily split or scale. Next, the design itself is roughly outlined. Then a handle is attached to the shell by means of a cement made of tar, resin and brickdust, the precaution being observed that the back of the shell-pattern is covered by a piece of paper of its exact size, soaked in water, and the cement pressed around the edges



LARGE CAMEO ON HELMET SHELL

White relief on a lustrous brown background illustrating one of the numerous conceptions by Italian artists of the classic incident of Diana avenging the intrusion of Actæon. [The half-tone is made by joining three photographs taken from different sides of the curving shell.] Morgan gem collection



of the shell. This is a necessary precaution as it prevents the cracking of the shell, and the cement is supposed to adhere only to the under layer.

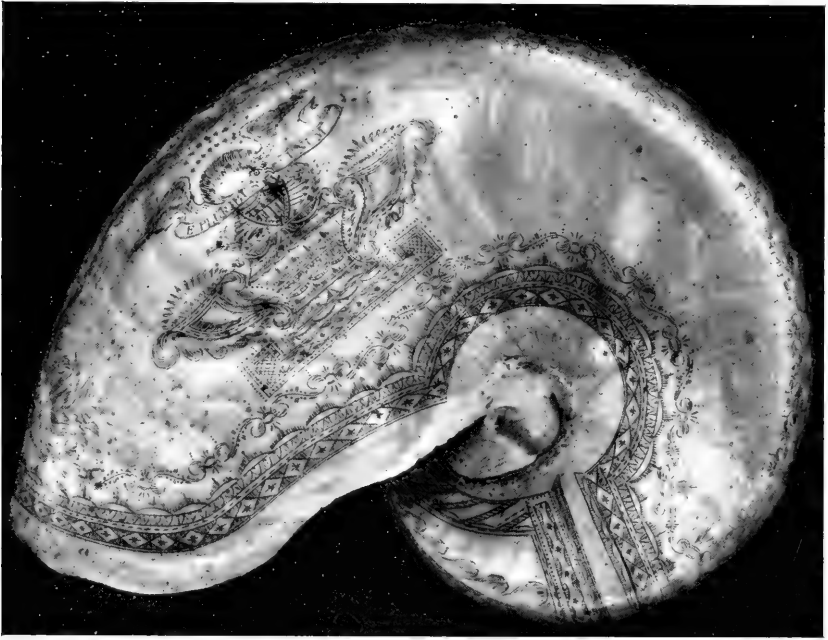
The cement cold, and the handle fixed in the wooden chancery of a notched board, cleaning the shell surface with pumice follows, and a more careful drawing on the white expanse in pencil. Ten implements may figure in the steps toward the finished product. These are steel gravers with sharpened, variously inclined and shaped ends of differing thickness and width, not remotely resembling the burin of the wood-engraver, and intended to be used as gauges, planes, scrapers and line points. These tools are sharpened on Turkey stone, moistened with olive oil. The cameo completed, the background is developed by rubbing it gently with the end of a square-sided stick of boxwood cut to a flat point and dipped first in crushed pumice stone and oil, then into a mixture of rotten stone and a few drops of sulphuric acid. This rubbing polishes and brightens the surface, evokes the deeper shades of color, and conveys to the cameo the contrast



As contrasted with the treatment of the Diana motive this carving of Phœbus in his chariot shows extreme elaboration of detail, a finely burnished surface and the last refinement of evenness in the relief

sought between the relief and its background. This final consummation must be closely watched and each burnished area immediately upon its completion wiped with a moist cotton spug to remove all trace of acid, which of course would corrode and dissolve the shell substance.

The three examples of this interesting *metier* in the Morgan gem collection show contrasted treatment. They are in the north end of the gem room, placed in an excellent light for their inspection. The subjects unfolded on them are the "Metamorphosis of Actæon" into a stag by the resentful Diana, whose swiftly directed arrow has already touched the unfortunate victim with its transforming charm, a copy of "Phœbus," the sun god, in his chariot and Guido Reni's "Aurora."



The pearly nautilus shell has been employed frequently as a surface for engravings and inscription of legends, prayers and emblems.

The most casual glance reveals two schools or methods of treatment, the bold, free romantic touch with its vivacity and acceleration of action in the first, and the classic calm and fastidious finish in the latter two. The collector and student of shell cameos is afforded here a very profitable material for study.

To-day shell cameos are perhaps lightly valued. They must have been wrought in great numbers for almost three centuries however, and in English, German and Scotch families domestic affection cherishes still the old brooches which a former day applauded as personal ornaments.



## SOME CUBAN FOSSILS

A HOT SPRING YIELDS UP THE BONES OF ANIMALS THAT LIVED  
BEFORE THE ADVENT OF MAN

By Barnum Brown

With photographs by the Author

**T**HE former connection of Cuba with the mainland of North, Central or South America has long been a subject of speculation, a one-time connection of the whole chain of West Indian islands with the continent being at once suggested by their position. But deep-sea soundings show that water ranging from one hundred to five hundred fathoms in depth separates Cuba from Florida while depths of more than one thousand fathoms separate it from Yucatan.

Cuba is at present rich in some phases of small life such as land shells, of which more than six hundred species have been described while less than half that number is known from the entire United States and comparatively few are common to the two countries. Of mammals however only three kinds

are represented, bats, rodents and insectivores, the latter two by a single species each. Covered as this island is with a luxuriant growth of subtropical vegetation, there are comparatively few exposures of the underlying



Entrance to the cave of Jatibonico. The black line above the entrance is not a crack but the covered passage of termites, a species of white ant which cannot stand strong light

Throughout Cuba, caves and fissures are of frequent occurrence, leached out of the limestone rocks by the chemical action of water

authenticity of its origin in Cuba has been questioned however by some geologists until lately. Additional light was thrown on the former animal life of this island when that enthusiastic Cuban naturalist, Dr. Carlos de la Torre, presented a paper before the International Geological Congress in Stockholm in 1910 and exhibited many fossils collected by him in northern Cuba.

In response to a request from Dr. La Torre I went to Cuba in 1911 to aid him in further search for fossil remains. In company with Dr. La Torre and his assistant, Mr. Victor Rodriguez, I left Havana one morning in June destined for the little town of Caibarien on the north shore, to reach which we traveled a day through sugar plantations, groves of royal palms and rural scenes so interesting one is loath to dismiss them with the term picturesque.

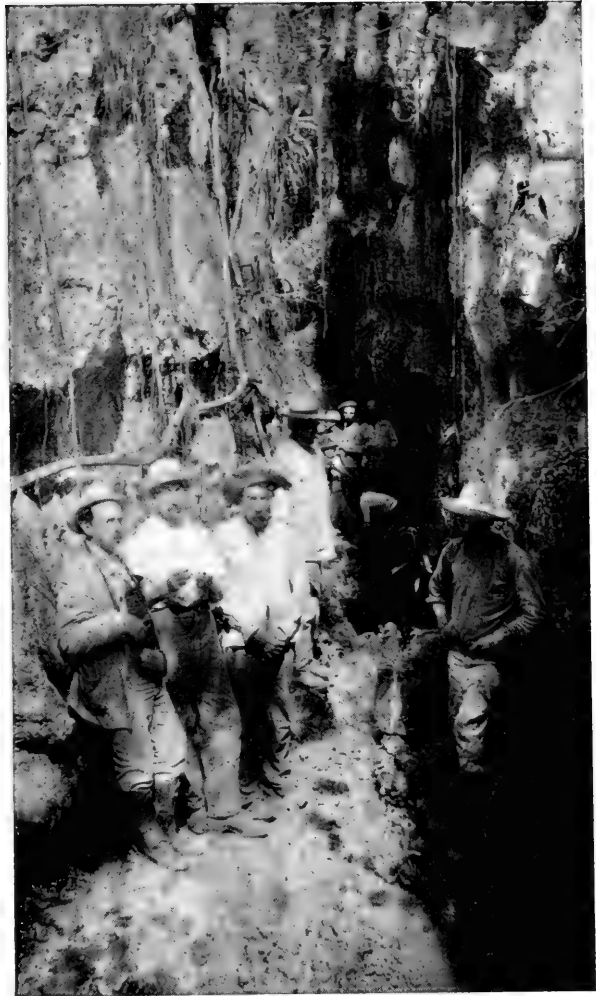
rocks and those showing are of igneous or oceanic origin, in which land animal remains are not found.

A comprehensive series of fossil animals, those forms that had lived there prior to the advent of man, would serve to determine the early history of this island. It was therefore of great interest when the discovery of a fossil sloth jaw was announced in 1860. In 1868 Dr. Joseph Leidy named this creature *Megalocnus rodens* and determined it to be related to the South American Pleistocene animal *Megatherium*. The au-

From Caibarien to Yaguajay it was a short sail by motor boat along the coast in shoal water where one could wade most of the way and where the only navigable course is marked out by tree branches. Seaward were long lines of low-lying sandy keys, the feeding-ground of countless brilliant flamingos magnified by the mirage into regiments of giant British soldiery. Another short journey by narrow gauge road, more sugar plantations and palms and we had reached the high land bordering the Sierra de Jatibonico.

It was in these mountain fastnesses that many Cuban patriots secreted their families,

where they lived in limestone caves and fissures during the period of Weyler's concentration movement. One of these refugees, Ramón González, while dipping water from a fissure one day discovered a jawbone that he recognized was different from that of any creature now living in Cuba. It is of interest to recall here that besides the bats which are more or less migratory, but two other mammals are at present peculiar to the island — namely, the rare insectivore *Solenodon*, and the more abundant ratlike tree rodent *Capromys*. The latter is protected by common consent and now almost venerated by the country people because during the war these creatures stood between the refugees and starvation.



Fissure of Jatibonico during the work of excavation. Left to right, Dr. La Torre, Mr. Brown and the discoverer Señor Ramón González



A drink on the trail. The *bejuco de parra*, resembling a grape vine, grows in forested regions. A section two inches in diameter and three feet long will furnish a drink of pure cool water

We went to the cave-fissure discovered by González and worked there, aided by many of the mountain people, who were greatly interested in the search and who gave us the hospitality of their homes — in return for national lottery tickets which they valued more highly than money. This fissure, evidently leached out of the limestone by the action of water, was about fifteen feet deep by three hundred feet in length and opened into a short cave. After cutting away the brush and orchids that partly filled the opening, we were soon at work turning over the mud. Bones showed here and there but were not plentiful. In a week we had completed [this work and secured much material but nothing new to Dr. La Torre's collection.

I doubt not that this fissure was long ago, as it is to-day, a cistern to which the animals whose bones are preserved there came to drink. During the dry season one may go a long distance in parts of Cuba without finding water. [A fact that was taken advantage of by the Spanish soldiers, who poisoned the wells and water holes. Nature had provided for the patriots however, for all through the islands there is a vine in the forests that resembles the grape and is called *bejuco de parra* from which a section three feet long will yield a drink of pure cool water.]

After other localities nearby had been examined for fossils without notable results, we determined to visit Ciego Montero on the south coast whence came the type specimen of *Megalocnus*. The *Baños de Ciego Montero*, meaning the "bath of the blind field man," is about thirty miles northwest of Cienfuegos near a small river, the Analla. Here are three thermal springs close together having temperatures respectively of 93, 96 and 98 degrees fahrenheit. Around the one of 96 degrees, the best known thermal spring on the island, a hotel with swimming pools has been built. The spring of 98

degrees is known as the "Chapapote" and in this one the jawbone of *Megalocnus* was said to have been discovered. This pool was surrounded by rushes and tall grass with an old dilapidated bathhouse on one side, as we found it, and from it flowed a rivulet in which there were many small fish. In subsequent work I collected here six species of fish that had become acclimated to the hot water, one individual having a length of six inches.

As the center of this pool was seven feet deep, we engaged a field hand to dive to the bottom. Tense and expectant were we three as Avalino dived time and again bringing up handfuls of black mud, finally a crocodile vertebra and after a few more efforts a mammal rib and some turtle fragments. These pieces showed that bones were numerous, so a large hand pump was secured from a nearby plantation. By pumping in relays we could in four hours exhaust the pool and keep the water down. Bones stuck



Royal palms near Aguacate. These are symbolic of Cuba; like regiments of grenadiers they outline the plantations in long lines that fade away in perspective



Trinidad and Lookout Hill



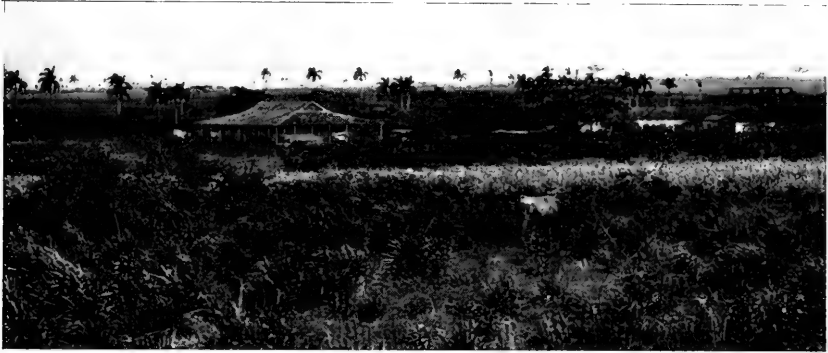
*Casa de Miños*, the house where Baron Humboldt dwelt in 1800 during his work in Trinidad



*Casa de Suarez*, the home of our mountain host. Country homes are made entirely from the royal palm; the trunk makes the walls of the house, the leaves make the thatched roof and the bracts cover the ridge pole. Stoves are uncommon, food is cooked over an open fire or on an earth-covered table



up all through the black mud in great profusion, jaws and bones of sloths, skulls of crocodiles and alligators, and parts of turtle shells. There were also numerous pine cones although at present pine trees are not found in the province of Santa Clara. In three days we had secured several boxes of bones but in so doing freed the partly choked opening until the water could no longer be kept out so that we could work, even with relays pumping night and day. A small hand fire-pump was then secured but the combined



Baños de Ciego Montero and railroad bridge crossing Analla River

pumps did not suffice. Finally a three-inch centrifugal gasoline pump solved the problem although it required constant pumping to keep the water out.

In three weeks' time we had taken out all material immediately surrounding the vent where the water boiled up out of a crack in the basaltic bed rock. Many bones were broken and showed the tooth marks of alli-



Baños de Ciego Montero, hotel in background and Chapapote spring in foreground. This spring of 98° fahrenheit was filled with living fishes and insects. In the muddy bottom there were hundreds of prehistoric fossil bones



Sanchez and Avalino at the pump. A stream of water six inches wide and an inch through flows from this spring constantly

gators, and few bones of any single individual were associated. One night a heavy rainstorm caused the Analla to overflow a part of the stream crossing the spring. Next morning there were shells and river turtles in the spring, an example of the way bones probably accumulated in prehistoric times.

The bones represent at least two genera and five species of sloth, the largest about the size of a black bear, a rodent, a peccary, birds, an alligator, a crocodile and three species of turtle. The fossils are of Pleistocene age and none are turned to stone. Some recent bones are mixed with them. The collection has not yet been prepared and studied, so that at present it would be premature to say what may be the final deductions. The sloths particularly are creatures of South American origin, but whether they reached the island by way of a land bridge or in some other way has not yet been determined.



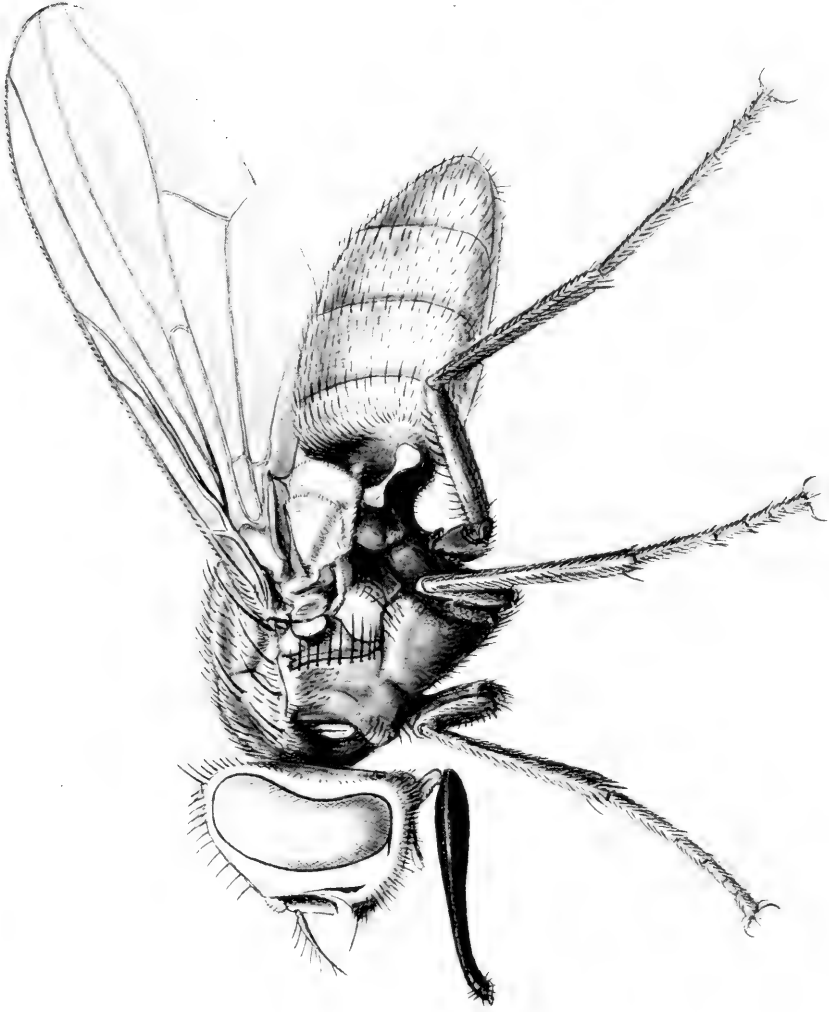
The centrifugal pump in action. The canvas covers the center of the spring. It was impossible to work in the combined heat of the midday sun and hot water without shelter

# AN INSECT-BORNE DISEASE — INFANT PARALYSIS

By C-E. A. Winslow

NO branch of public health science has been more dramatic than the progressive conquest of the insect-borne diseases. Up to 1898 malaria was a "bad air" disease, a mysterious miasm that crept out at night from the swamps to seize on its helpless victims. Then the Englishman, Ross, and the Italian observers, Grassi and Bignami, solved the problem and the mystery resolved itself into a question of controlling mosquito-breeding pools. When the American army of occupation went into Cuba in 1898 yellow fever was raging. It had killed on the average seven hundred and fifty men and women in the city of Havana every year. Our administrators were at first helpless. The ordinary methods of sanitation served to control typhoid fever and smallpox and other diseases whose causes were known. Yellow fever decreased from the high figures of 1898 when the Havana hospitals were filled with soldier victims, but in 1900 it began to rise again. Then in March 1901, the American Army surgeons, Reed, Carroll and Agramonte, heroes and martyrs of the war against disease (for two of the three gave their lives to the cause) announced the discovery that yellow fever too was carried by a mosquito of the genus *Stegomyia*. With this basis for action the conquest of the disease was almost immediate. For 1901 there were eighteen deaths from yellow fever in Havana and for 1902 and succeeding years, none. A few cases later occurred in a little epidemic around the wharves in which the infection was introduced from outside but the endemic scourge of the city for centuries had been stamped out in a single year. So the discovery of each new disease germ and each new insect host has substituted effective measures of control for helplessness and fear.

The latest of the insect-borne diseases to yield up its secret is infant paralysis or poliomyelitis. This infection, mild and obscure in its onset, but not infrequently fatal and usually leaving its victims more or less permanently crippled, was entirely a mystery until four years ago. It is not a new disease. In the light of modern knowledge it is clear that various historical personages have suffered from it. In 1905 however, it assumed a violent epidemic form in Sweden and quickly spread to this country, appearing first in 1907 in the eastern coast cities and in 1908 in the Scandinavian states of the Northwest. In connection with this disease I received a vivid lesson in the helplessness that characterizes the prescientific period of disease. It was in a little summer colony on the Massachusetts coast, a colony of about twenty houses stretched out along a road through the salt marshes. First a mild case occurred, not recognized at the time but since thought to be infant paralysis. Then in rapid succession two



**THE INSECT THAT TRANSMITS INFANT PARALYSIS**

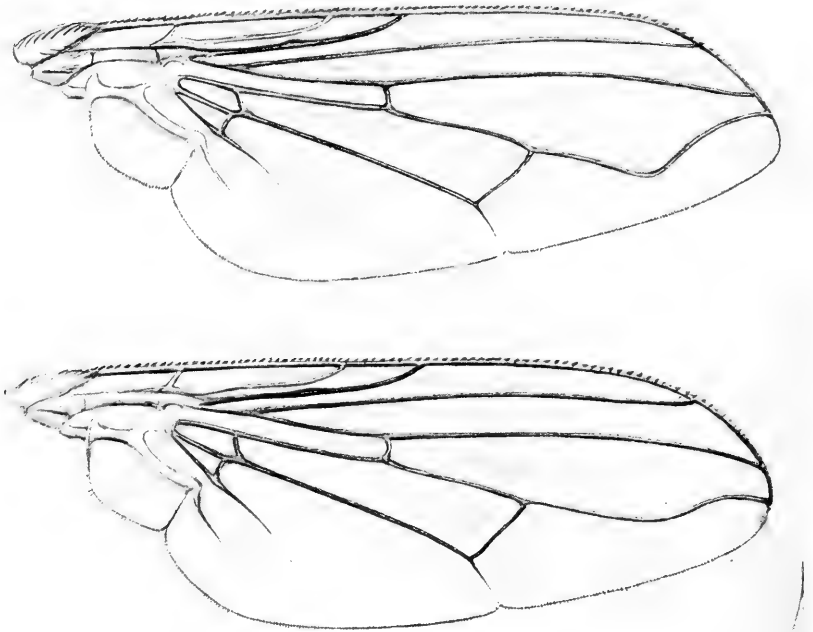
Original drawing of the biting stable fly (*Stomoxys calcitrans* Linn.) by Mr. Ignaz Matzka of the Museum's preparation department. This fly closely resembles the house fly and may easily be mistaken for it. Compare with figure on page 233

children in one family were taken with it and died. There were children in almost every house and the parents felt the gravest alarm. Many were physicians accustomed to control disease and not to fear it. Here was an unknown force however which no one could control. Was this disease carried by people or air or domestic animals or insects or food supplies? No one knew. Finally a fourth case occurred, further along the road; and the next morning every family in the little colony had gone. There was no rational mode of fighting this "pestilence that walketh in darkness," no recourse but flight before it. This was the attitude of mankind toward every epidemic disease before Jenner and Pasteur.

The first steps were taken in clearing up the mystery of infant paralysis when in 1908 Landsteiner and Popper in Vienna succeeded in transmitting the disease to monkeys. Flexner and Lewis at the Rockefeller Institute in the next year extended this work and proved by successive inoculation experiments that there was a living germ present in the body and in the nose and throat of affected persons although this germ belongs to the class of the "filterable viruses," organisms so minute that they will pass through the pores of a Berkefeld filter and cannot usually be distinguished under the most powerful microscopes. Very recently during the past winter, Flexner and Noguchi have added new laurels to the Rockefeller Institute and to New York by cultivating this almost invisible germ outside the body. Animal experimentation however, which has been the chief agent in bringing communicable disease under control, made it possible much earlier to detect the presence of the germ by its effects. Flexner and Clark at the Rockefeller Institute, Kling, Wernstedt and Pettersen at Stockholm, Osgood in Boston, and others showed that the germ may persist in the nose and throat after recovery and that it may be found in the nose and throat of healthy persons who are therefore liable to act as carriers of infection, although themselves not sick. It seemed probable that at least one method of spread of infant paralysis was by more or less direct contact between susceptible persons (particularly children) and either previous cases or healthy carriers.

There were two things however which seemed puzzling and which could not easily be harmonized with this theory of spread by human contact. In the first place infant paralysis is preëminently a summer disease. Cases do occur at all seasons but the great majority develop during the warm weather. Now this is a characteristic of insect-borne diseases like malaria and yellow fever since the breeding of the insect hosts is directly dependent upon temperature. On the other hand, diseases which spread by contact usually reach their maximum in winter when people are crowded together and there is most opportunity for the interchange of germs. There are exceptions to this rule, like typhoid fever, which is normally a summer disease though in the northern United States it is not generally carried by

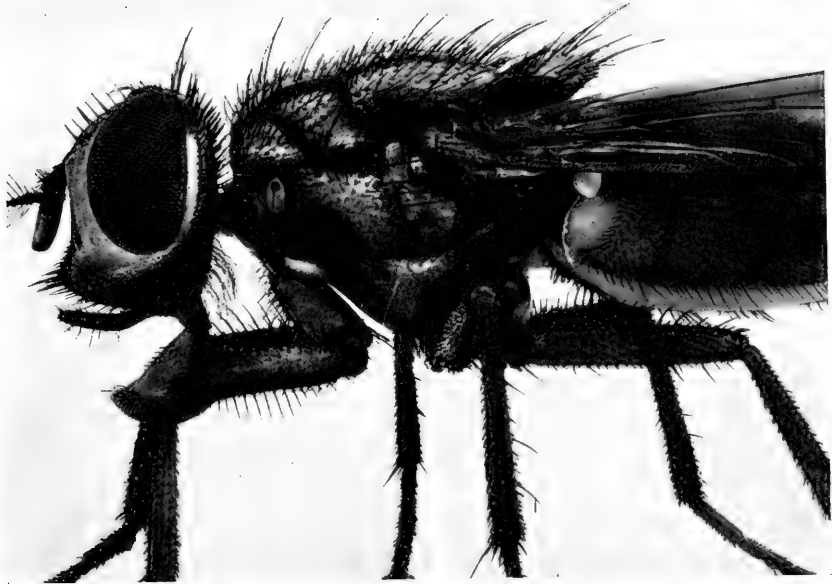
insects; so the seasonal prevalence proves nothing by itself. Another curious fact brought out in the Massachusetts studies by Richardson however was the greater proportionate incidence of infant paralysis in rural than in urban districts. Again the rule is not a universal one, but the fact that even in one state a distinctly higher percentage of cases occurred in the country than in the city was a striking one. Diseases that spread directly from person to person are almost always most prevalent where persons



Wing of the house fly (*Musca domestica*) above and of the stable fly (*Stomoxys calcitrans*) below. Note the sharp elbow in the third long wing vein of *Musca* and the less bent vein of *Stomoxys*. Drawing by Ignaz Matusch

congregate so that the opportunities for contagion are most frequent; while insect-borne diseases are often most serious in the country where insect breeding places are more frequent.

These facts led the Massachusetts investigators to search with special care for a connection between some insect host and the prevalence of infant paralysis, and in 1910 Dr. P. A. E. Sheppard, working for the state health department, noted the large number of cases in which fly bites were reported



Side view of house fly from enlarged model made by Mr. Ignaz Matausch. The house fly has not the long biting proboscis characteristic of the stable fly which transmits infantile paralysis. Compare with figure on page 230

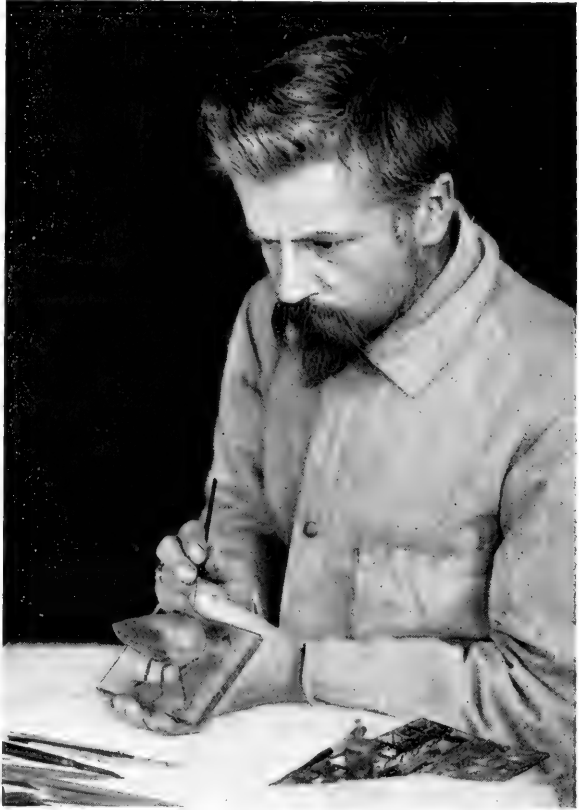
by the victims of the disease. In the next year Mr. C. T. Brues, an entomologist, was assigned to work with Dr. Sheppard and suspicion began to point strongly toward a particular insect, the biting stable fly. Finally in the summer of 1912 Prof. M. J. Rosenau of the Harvard Medical School completed the chain of proof. No one who was present at the joint session of Sections I and V of the Fifteenth International Congress of Hygiene and Demography on September 26th last will forget that most striking event of the whole Congress, the presentation of these results. Eminent investigators from Norway, Sweden and Austria, as well as some of the leading workers in this country, had presented the formal papers of the morning. Much that was important was added but the weight of evidence still seemed to point, though somewhat doubtfully, toward human contact as the chief agent in the transmission of the disease. In the discussion that followed, Dr. Rosenau made a preliminary report of his experiments and announced that he had succeeded in producing poliomyelitis in six out of twelve monkeys bitten by stable flies (*Stomoxys calcitrans*) which had been allowed to feed on other monkeys suffering from the disease. As a result of his discovery the entire outlook for the control of infant paralysis has been changed.

Prof. Rosenau's work has since been confirmed by Drs. Anderson and Frost of the United States Public Health Service. There is of course no certainty that the disease is always transmitted by *Stomoxys*. The work of Dr. Flexner and of the Swedish observers and the occurrence of a certain proportion of cases in cold weather strongly suggest that sometimes

infant paralysis may spread by direct contact between human beings or in other ways than by fly bites. On the other hand it seems certain that the biting stable fly is one means by which this disease is conveyed; and the seasonal and geographical prevalence of the epidemics makes it seem probable that this is the usual and most important means.

The *Stomoxys calcitrans* like the house fly or filth fly (*Musca domestica*)

is a two-winged fly of the family Muscidae. It closely resembles the house fly in general form and size and may easily be mistaken for it by the casual observer. It differs from the house fly in one very important respect however, in the possession of a sharp biting proboscis instead of the soft tongue-like mouth parts with which the house fly absorbs its food. This proboscis of the *Stomoxys* may be seen projecting forward as a fine black beak when the insect is at rest. Another important difference lies in the venation of the wings, the third of the long veins being bent at a less sharp angle in



Mr. Ignaz Matausch, preparator, who has recently completed a marvelous piece of technical work in the shape of an enlarged model of the common house fly. It represents a magnification of 64,000 diameters, required one year for its construction and is the most accurate representation of this insect in existence

the *Stomoxys* than in the house fly. Two additional points of difference between the house fly and the stable fly are brought out in Mr. Matausch's original drawing reproduced herewith: that the posterior edge of the compound eye as seen in side view is concave in *Stomoxys calcitrans* and practically straight in *Musca domestica*; and the antennae of *Stomoxys calcitrans* are clothed with hairs on the upper side only while those of *Musca domestica* have hairs both above and below.



The habits of *Stomoxys* differ widely from those of *Musca domestica*. The *Stomoxys* is a biting fly, feeding on the blood of the higher vertebrates. It is found in the vicinity of dwellings, particularly where horses and cattle are kept, but it is apt to remain out doors in warm sunny places and does not come into the house much except at night and before rain. According to Brues it breeds in "fermenting heaps of grass, straw and similar substances, horse manure, cow dung and even garbage" and its preference is probably in "about the order named." Many devices used for trapping the house fly and depending on its liking for sweets will of course prove of no avail with the stable fly. For the control of this insect, dependence must probably be placed chiefly upon elimination of its breeding places. There can be no doubt that the recognition of the importance of this insect in the transmission of infant paralysis, which we owe to such a striking coöperation between epidemiologists, entomologists and experimental physiologists, opens a new chapter in our campaign against this disease; and the summer of 1913 should throw a flood of light upon the subject.

## STORAGE OF MAMMAL SKINS

By Roy C. Andrews

THE care of large mammal skins is one of the problems which every museum has to meet. The two things most to be desired are safety and accessibility and in order to secure either it is sometimes difficult not to sacrifice the other. The skins when they have been received from the field are first tanned after which they can be easily folded, but even then are of great bulk and in some cases of considerable weight.

The problem of their storage has been met by different institutions in various ways. One museum stores the skins in large cans eight or ten feet long by four or five feet in height and as much in depth, where the specimens can be spread out almost at their full length. This method has its advantage but the very serious difficulty of requiring an almost unlimited amount of space. The cans are however movable which is a point in its favor.

Another American institution is contemplating the installation of a cold storage room in which the skins will be hung from racks which can easily be pulled out and examined and where the temperature is sufficiently low to prevent the breeding of *Dermestes*, the pest of all natural history collections.

The American Museum of Natural History has met the problem in a still different way. In two large rooms storage cases have been built solidly into the wall. The backs and sides are of cement, the doors of iron and the trays of woven iron wire. The cabinets are about six feet high, above them a latticed iron floor has been built and a duplicate row of cases installed thus giving a second-floor room and double space, all of which is readily

accessible. Nothing has been used in the preparation of the rooms other than iron and cement so that in case of fire if the doors were closed the cases would be practically safe. The trays on which the skins are placed slide easily upon angle-iron ratchets and a whole tray or a single skin can be re-



Fireproof storage cases built solidly into the wall. Backs and sides are of cement, doors of iron, trays of woven iron wire. An open can of carbon disulphide protects from insects

moved without the slightest difficulty. An open can of carbon disulphide placed on one of the shelves at the top of the case will allow the gas to penetrate into all skins and is a sufficient protection from insects.



Skins of the beautiful Peary caribou, showing every variation of age, sex and pelage. The storage cases of the American Museum preserve such material while making it always accessible for study

Each cabinet bears a label on the door outside giving the species and the number of each skin contained in the compartment. Thus it is possible to tell not only the storage case but the actual tray on which the specimen desired has been placed. A long iron table in the center of the room is convenient for the examination of skins and for study of such specimens as it is not desirable to remove from the storage rooms.

Of some species of large mammals the Museum contains an extensive and important series. For instance the beautiful Peary caribou are represented in the collection by about one hundred and twenty-five specimens showing every variation of age, sex and pelage. These are the only skins of this species in any museum of the world and in themselves present an extremely interesting and valuable collection. The musk oxen also, are represented by an almost equal number of specimens.

While many of these skins will be exchanged in the future for other museum material, nevertheless in the meantime they must be carefully preserved and be accessible for study; to this end the storage cases are proving eminently successful.

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Life Members*, MRS. MARY A. TUTTLE, MISS GRACE SCOVILLE and MR. ARNOLD SCHLAET;

*Annual Members*, MRS. WILLIAM G. ROCKEFELLER, MRS. STANFORD WHITE and MESSRS. SIEGMUND ADLER, T. BROOM BELFIELD, FREDERICK BLASCHKE, HOWARD CHANDLER CHRISTY, JOSEPH C. HAND, AUGUSTUS F. KING, ALEXANDER KONTA, HENRY S. LAKE, H. G. RAMSPERGER and LLOYD W. SEAMAN.

THE Couper bust of Professor Albert S. Bickmore [See frontispiece] has recently been placed at the entrance to the Museum auditorium, an especially appropriate location since Professor Bickmore was so intimately associated with the organization and development of the lecture system at the Museum. From 1886 to 1903 at a time when he was a leader in the work of the Museum, he was also identified with the State Department of Public Instruction. He was one of the pioneers in lantern-slide work, being probably the first educator to exhibit slides of such accuracy and beauty. He kept photographers traveling in different parts of the world collecting photographs and he bought the best negatives that were brought back by Museum and other explorers. From such negatives he made up a series of lectures for the teachers in the public schools. When the contract between the Museum and the State terminated, all of the slides and of the original negatives from which the slides had been made went to Albany, Professor Bickmore's personal set of slides alone remaining at the Museum. The great value attaching to this latter set, recently presented to the Museum by Professor and Mrs. Bickmore, was realized when the Albany fire destroyed the original negatives and slides. It is this set of 12,000 beautifully colored slides that has made it possible for the Museum to carry on its effective lecture work for school children. During the spring more than twenty lectures were given in the regular course and these were attended by nearly 19,000 pupils. In addition the slides have been in great demand by teachers for special lectures given at the Museum by members of the Museum staff or by the teachers themselves.

THE CROCKER LAND EXPEDITION is to be congratulated on the appointment as surgeon of Dr. Harrison J. Hunt of Bangor, Maine, Bowdoin College, A. B., 1902 and M. D. 1905.

*A Review of the Primates* by Daniel Giraud Elliot has recently been published by the Museum. This is a monographic treatise in three quarto volumes containing 1360 pages, 28 colored plates and 512 half-tone figures. Although the apes, monkeys and lemurs surpass all other mammals in scientific interest, it is a striking fact that no satisfactory review of all the known living species has hitherto been published. Dr. Elliot's work treats not only of the generic and specific characters, synonymy, literature and other technical matters, but also very fully of habits. The living animals are shown in twenty-five plates and twenty-eight colored plates, the latter mostly reproductions in four colors from the original lithographic figures published in the *Proceedings of the Zoological Society of London*; and photographs of the skulls of more than one hundred species are reproduced with a clearness to allow technical comparisons. *A Review of the Primates* is interesting also as an example of beautiful book-making. The edition is limited to 850 copies, 500 being offered for sale.

By arrangement with the Ottawa Museum, Dr. Rudolph M. Anderson of the Canadian Arctic Expedition will bring back a set of duplicate specimens to fill the gaps still existing in the mammal and bird collections of the American Museum.

DR. J. A. ALLEN has been working at the British Museum during the past six weeks on the mammals of Korea and South America. His work is particularly complete on South American squirrels, the material which Mr. Chapman's expedition secured in Colombia and the large unidentified collections of the British Museum providing for an entire revision of the group. The work on the Korean mammals collected by Mr. Andrews in northern Korea had the benefit of comparison with British Museum specimens secured by the Duke of Bedford's earlier expedition to Korea, the British Museum being practically the only institution in the world which contains any series of mammals from the region.

DR. ARTHUR B. EMMONS of Harvard University, has published an article in *Biometrika* on "The Variations in the Female Pelvis, based on observations made on 217 specimens of the American Indian Squaw." This study is founded largely upon skeleton material in the American Museum. The results were so important that the author was awarded the Boylston Medical Prize for 1912.

THE Museum's zoölogical expedition to Colombia returned early in May, after an absence of four months. The objects of the expedition were first, to collect material for a habitat group illustrating the bird life of the Magdalena Valley; second, to complete the ornithological survey of the Colombian Andes, begun in 1910; third, to ascertain definitely the limits of the so-called Bogotá region whence, for the past seventy odd years specimens collected by natives, but unaccompanied by data of any kind have been received; fourth, to collect a series of topotypical specimens from the Bogotá region. The expedition included Mr. Frank M. Chapman, and Messrs. George K. Cherrie, first assistant, Louis Agassiz Fuertes, artist, Thomas Ring, Paul G. Howes, and Geoffrey O'Connell, volunteer assistants. This party left Barranquilla on January 19, and during the voyage of twelve days up the Magdalena River to Honda, by taking advantage of every opportunity when the boat stopped for cargo or fuel, collected three hundred birds. Studies for the habitat group were made at El Consuelo, on the western slope of the Eastern Andes, 2700 feet above Honda; from this point a superb view is had of the Magdalena Valley, through which the river winds picturesquely, while in the background the Central Cordillera rises crowned by the three great snow peaks, Tolima, Isabel, and Ruiz, each of which has an approximate altitude of 18,000 feet.

Having completed its work in this region, the expedition journeyed by mule to Bogotá, making this city its headquarters during the remainder of its stay in Colombia. From Bogotá it passed first to the eastward to Villivencio, at the eastern base of the Andes, stopping *en route* at all favorable localities. On reaching Villivencio, the section through the Andes from the Pacific coast to the upper drainage of the Orinoco, was completed, and data are now in hand for the determination of the altitudinal life zones of the Colombian Andes. A month later the expedition returned to Bogotá and passed southward to Fusugasuga, encountering there entirely different species from those which it had met with in its journey to the eastward. In all, some 2300 birds and about 100 mammals were secured, and the diversity and richness of the avifauna is illustrated by the fact that no less than 505 species of birds were secured during the comparatively brief period when the expedition was actually in the field.

DR. P. E. GODDARD is preparing for a trip to the upper Peace River country of northwestern Canada to make a study of the Beaver Indians, a little known tribe of the Northwest; and Dr. Herbert J. Spinden will spend the summer in New Mexico on ethnological work among the Pueblo Indians of the Rio Grande Valley.

THE department of mammalogy has begun the revision of its osteological collections with reidentification and card-indexing, and also the work of restorage of these collections in the new storage room where they will be for the first time in wholly accessible shape for study.

MR. VILHJÁLMUR STEFÁNSSON returned to the Museum about the first of May after two months in Europe chiefly in Rome where he delivered a paper at the International Geographic Congress, and in London where he assembled oceanographic and other scientific apparatus. The Stefánsson Expedition, as now planned, will consist of a scientific staff of fourteen men divided into two parties: one sailing north from Herschel Island in the "Karluk," a 247-ton whaling vessel, and the second east in a twenty-ton vessel fitted for cruising in small rocky waters.

The northern party under Mr. Stefánsson's leadership, with a captain and crew of fifteen men, will be made up of six scientists, among whom will be Mr. W. T. McKinlay of the University of Glasgow, in charge of terrestrial magnetism; Mr. George Malloch, member of the Canadian Geological Survey, geologist and specialist in stratigraphy; and Mr. James Murray of Glasgow, oceanographer for many years and co-worker of Sir John Murray, member of the Sir Ernest Shackleton Antarctic Expedition, and recently of the Colombian boundary survey of South America.

The southern party under Dr. Rudolph M. Anderson, zoölogist and second in command, will have a personnel of eight men among whom the following are of note: Fritz Johansen, biologist in the Department of Agriculture, Washington, with a record as member of the Mylius-Erichsen East Greenland Expedition; Henri Beuchat, French anthropologist and author; Dr. D. Jenness of Oxford, ethnologist with field experience in the South Sea Islands; Dr. A. Forbes Mackay of the University of Edinburgh, experienced as a British naval surgeon and as surgeon of the Shackleton Antarctic Expedition; and Mr. J. J. O'Neil of the Canadian Geological Survey, mining geologist and specialist in copper deposits.

The plan of the northern party includes three or four years' investigation of the unexplored area north of western Canada and Alaska, to the end of securing comprehensive scientific data covering the region. It will use new land discovered, as a base of supplies or will push east and establish a base on Prince Patrick Island. From such base, exploration will move northward, in summer by boat and in winter by sledge. The southern party with secondary base on Victoria Island will give special study to those Eskimo tribes showing an admixture of European blood, discovered by Mr. Stefánsson on his previous expedition under the auspices of the American Museum; as well as to the copper deposits also discovered and other matters of scientific and economic interest. Because of the very liberal support of the Canadian Government the expedition has been able to broaden both its geographic aims and the scope of its scientific research from the original plans. Mr. Stefánsson will remain at the Museum until the last of May and the expedition will sail from Victoria sometime in June.

DR. C-E. A. WINSLOW has been appointed chairman of a commission which is to spend \$50,000 in the experimental study of ventilation problems during the next four years. The other members of the commission are: Prof. F. S. Lee of the College of Physicians and Surgeons, Prof. E. L. Thorndike of Columbia University, Prof. E. B. Phelps of the Massachusetts Institute of Technology, Dr. James Alexander Miller and Mr. D. D. Kimball. The fund is part of the gift made by Mrs. Elizabeth Milbank Anderson to the Association for Improving the Condition of the Poor.

MR. ALANSON SKINNER, assistant curator in the department of anthropology, is making collections for the Museum among the Western Ojibway Indians of Long Plains, Manitoba.

# The American Museum Journal

VOLUME XIII

OCTOBER, 1913

NUMBER 6

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MARY CYNTHIA DICKERSON, *Editor*

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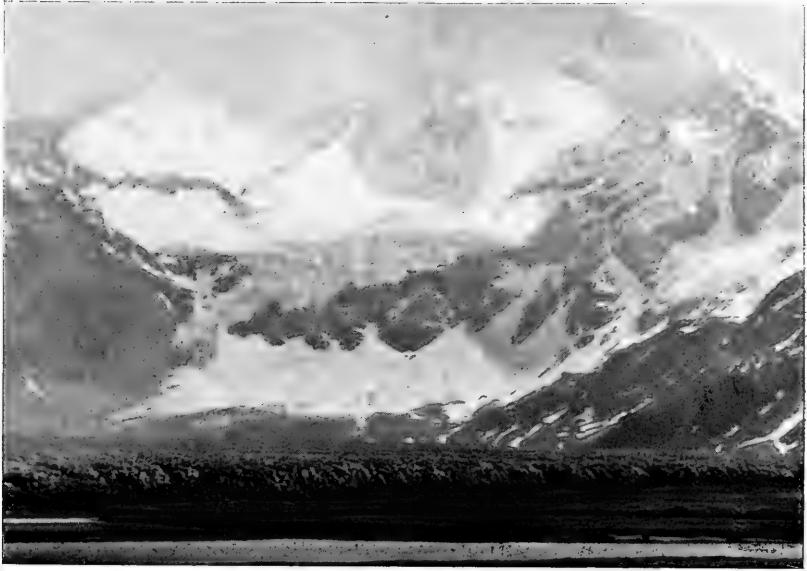


Photo by J. I. Wilson

**"BEACH MASTER" WITH A SMALL HERD OF COWS**

The question as to whether sea elephants are extremely polygamous is still unsettled. Certainly bulls of this type attack any other bull which comes into the vicinity. Cumberland Bay





## A DESOLATE ISLAND OF THE ANTARCTIC<sup>1</sup> SOUTH GEORGIA, IN THE LATITUDE OF CAPE HORN, THE GREATEST WHALING GROUNDS OF THE WORLD

By Robert Cushman Murphy

Curator, Division of Mammals and Birds, Brooklyn Museum

THE cold white hills of South Georgia were a most welcome sight after five months of sea life. That desolate isle, which for more than a hundred years has been the scene of ruthless sporadic destruction of fur seals and sea elephants, has of late become the base of the greatest whaling grounds in the world. The modern industry was instituted by a Norwegian of both north and south polar fame, Captain C. A. Larsen, who in 1893 touched at South Georgia with the "Jason" while on his expedition which led him into the Antarctic Sea east of Graham Land. Eight years later Larsen commanded Nordenskjöld's vessel, the "Antarctic," which likewise visited South Georgia, and upon returning thence he determined to establish a whaling station of the modern Norwegian type. Thus the *Compania Argentina de Pesca* was incorporated in Buenos Aires, and the right of locating in Cumberland Bay, South Georgia, was secured. Larsen's success led to the establishment of other plants, so that now in addition to the Argentine station there are five Norwegian and two English

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#### WHALE SKELETONS ALONG THE SHORES OF CUMBERLAND BAY

Twenty-five miles of seacoast covered with the debris of the whale factories — skulls, spinal columns, loose vertebrae, flipper bones, ribs and jaws piled in heaps and bulwarks to the farthest high water mark. The whale companies are now required by law to utilize waste material which is manufactured by guano plants into fertilizer to sell for several pounds sterling a ton

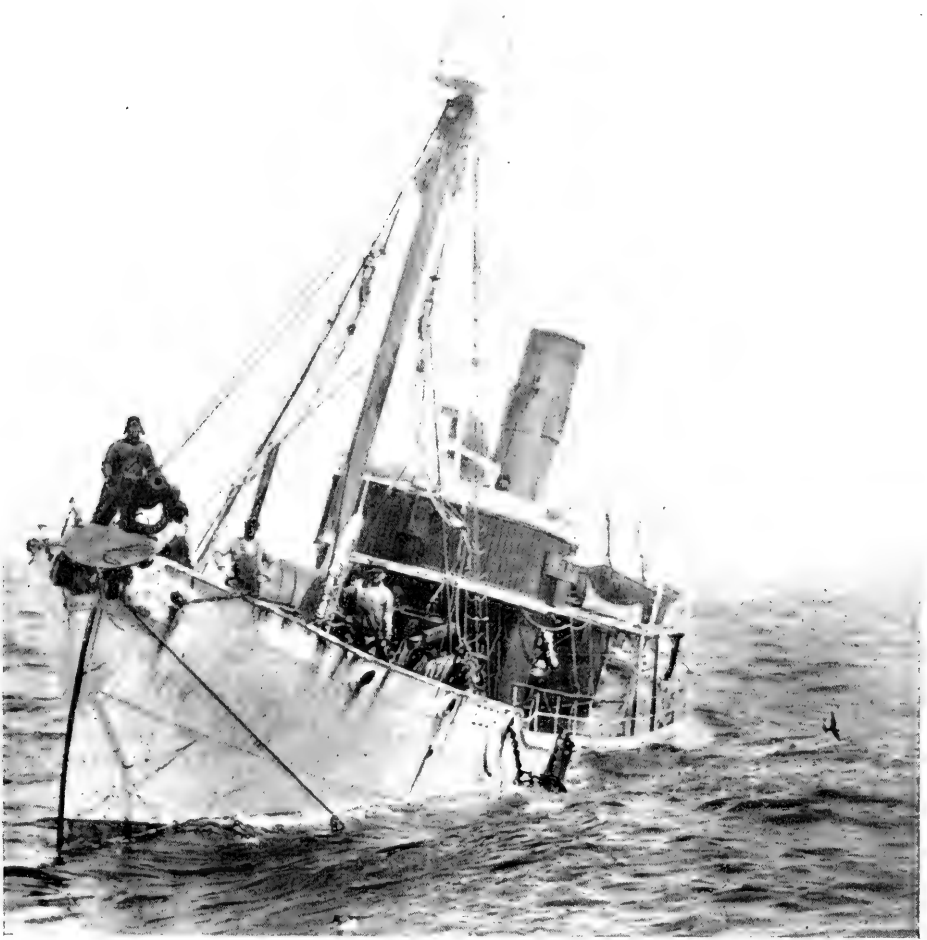
companies operating in various harbors along the northeastern seaboard of the island, and more than two thousand men are at work manufacturing oil and fertilizer and other products of the whale's carcass.

Phenomenal success has attended the whole industry; more than five thousand whales have been towed into the ports of the island in one year; twenty carcasses are sometimes received at a single station during twelve hours; and two and a half million gallons of oil have been tried out at one station during a season, to say nothing of whalebone and guano. Several of the companies have yielded a profit of more than one hundred per cent to the stockholders. And still the whales show slight signs of diminished numbers, although they are said to have become more difficult to capture than they formerly were. At present transportation is maintained between South Georgia and Buenos Aires; a British magistrate resides at Cumberland Bay, which has been declared a port of entry; and legislation designed to control the destruction of wild life has finally been enacted.

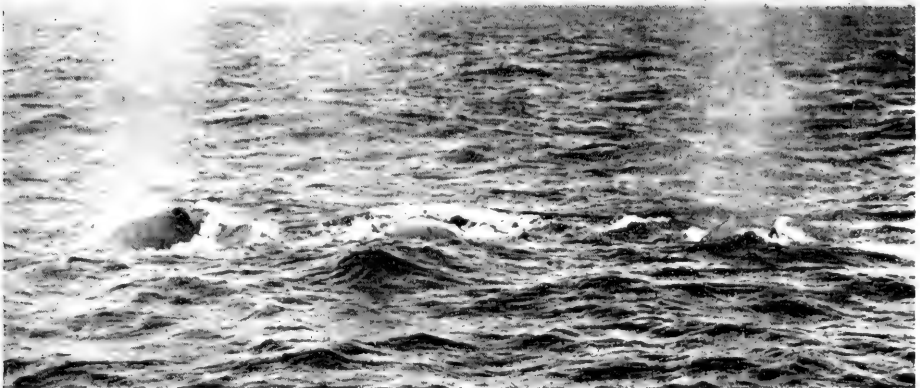
The whale taken in greatest numbers at South Georgia is the southern humpback or *knöll*, which is the mainstay of the industry. The slenderer and less profitable finback is also abundant, and is shot whenever the former species is scarce or shy. The giant blue whale or sulphur-bottom is third in importance, while sperm and right whales are taken more rarely, perhaps only once or twice a year. The height of the whaling comes during Christmas season, that is about midsummer.

The expedition to South Georgia Island, conducted jointly by the American Museum of Natural History and the Museum of the Brooklyn Institute of Arts and Sciences, returned last May after an absence from the United States of exactly one year. The itinerary of the New Bedford whaling brig "Daisy," which carried the museums' representative, was pleasantly roundabout, including in its course several West India islands, the Cape Verdes, the Brazilian island of Fernando de Noronha, and the uninhabited South Atlantic islet Trinidad, and affording opportunity for field work at each of these interesting tropical localities. The objective point of the voyage, South Georgia, lying in the latitude of Cape Horn, was not reached until November 23, 1912.

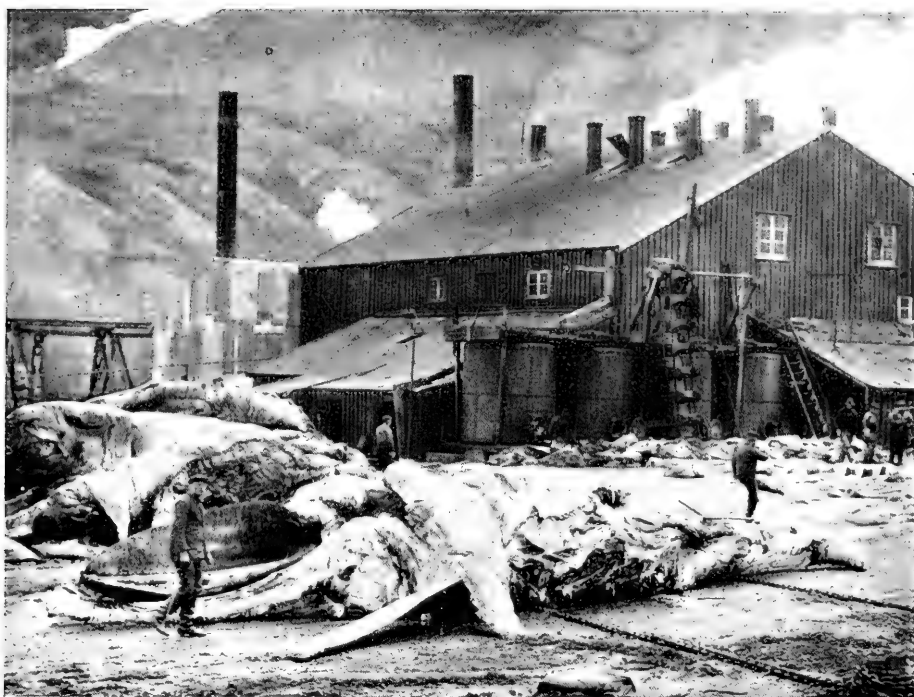
Although the long cruises in the tropical Atlantic, where not infrequently many days passed without sight of a bird, fish or other living creature more conspicuous than a Portuguese man-o'-war, were sometimes monotonous, such periods were well balanced by the occasional excitement of sperm-whaling or blackfish-hunting. The latter cetaceans were frequently encountered, and a good series of skulls of the tropical species was secured for the museums, the animals being captured with hand harpoons according to the venerable methods of the sperm-whale chase. Blackfish travel in large shoals, often in company with porpoises. I have seen both species, mixed more or less indiscriminatively, swimming along peaceably together in groups of three or four, the individuals of each group almost touching sides. When



A Norwegian whaling steamer of South Georgia just after the shot. A humpback whale is fast, and the harpoon line (on the port bow) is being drawn in by a steam winch located behind the mast. The chopped-off flukes of a dead whale show amidships. Note in the foreground a Wilson's petrel (*Oceanites oceanicus*) which migrates northward to our coast every year, and farther back a Cape pigeon (*Daption capense*) one of the commonest petrels of the southern seas



Three humpback whales (*Megaptera* sp.), two spouting. Photographed from a Norwegian whaling steamer, South Georgia



The whale-slip, Grytviken, Cumberland Bay

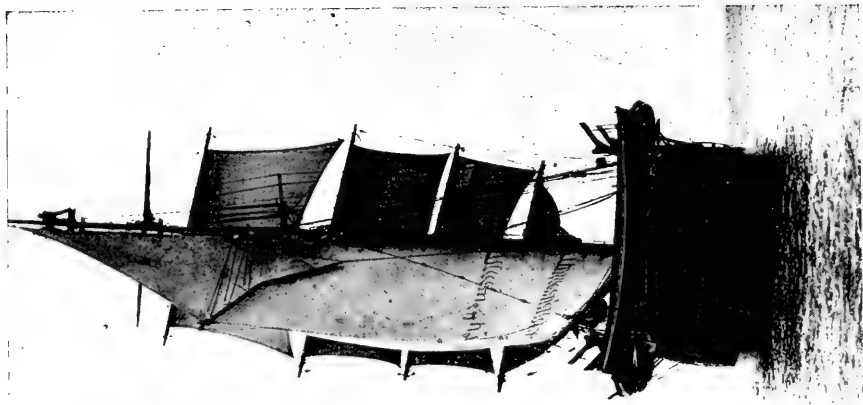


Snow-covered Mount Paget towering seven thousand feet above King Edward Cove, where is situated the meteorological station of the Argentine Government



BLACKFISH (*Globiocephalus* sp.?)

During the long cruises in the South Atlantic many days passed without sight of living creature, a monotony counterbalanced by the occasional excitement of blackfish-hunting according to the ancient method with hand harpoon



IN WHALING TRIM

The "Daisy" of New Bedford, the whaling brig which carried the expedition to the Antarctic and had previously been to Kerguelen Land and twice to South Georgia

blackfish are moving leisurely at the surface the back fin is exposed most of the time, but occasionally they lie idly, with the head, fin and flukes all under water and only the rounded angle of the high caudal ridge projecting above. When they rise to breathe the great square "junk" or snout, which yields the most valuable of all lubricating oils, is commonly thrust out of water as far as the eyes and the angle of the mouth. They are rather wary cetaceans, often avoiding the whaleboats with tantalizing skill, leading on the oarsmen only to render the pursuit hopeless in the end. Lying quietly at the surface they wait until the boat draws almost within striking distance and then "let go," as whale-men say, that is they sink straight down without appreciably altering the inclination of the body. From the masthead I have watched them thus lowering far down into the clear water until they became indistinct shadows. Within a few moments they reappear a short distance away, and sometimes, as if in mockery, raise their hinder ends out of water and beat the surface ten or a dozen times with the flat of the flukes, making a loud tattoo — a trait which recalls the "lob-tailing" of the right whale. If however the blackfish harpooner be so fortunate as to make a successful dart, the members of the herd gather about their wounded comrade and it then becomes comparatively easy for the other boats to select and strike their victims. Once fast, the struggle is but begun, for blackfish are strong fighters, sometimes tearing out even deeply buried irons. Usually they pull straight away for a short distance, and then resort to dodging tactics, jerking the boat violently from side to side or spinning it end after end. As the prize becomes exhausted and the boat is drawn close, there is a final flurry in which the captive lashes itself back and forth under the bow with terrific jerks, so that quick and skillful work is required in lancing.

In the South Atlantic, visible animal life was far more abundant than we had found it within the Tropics. Vast flocks of petrels of many species were our constant companions, and during rough weather numbers were caught on fishlines from the stern of the vessel, an exciting form of angling, especially if the game chanced to be an albatross or giant petrel with the baited bent nail at the end of a slender hand-line jammed in the hook of its bill, the bird being held only by its own resistance. The smaller petrels such as Cape pigeons, were caught on fishhooks and were hauled from the air as animated kites after they had pounced upon the trailing baits and had started to fly off with them.

The day after we had "made the land" at South Georgia the "Daisy" was towed by one of the whaling steamers into King Edward Cove, Cumberland Bay. This cove is the old "Pot Harbor" of American sealers, a term which has been preserved in a translated form as the name of Captain Larsen's whaling station — *Grytviiken*. The tiny, land-locked haven nowadays greets the visitor through his sense of smell long before he rounds the point which shuts its entrance from view. The "whaly" odor increases

again as one enters the cove, which might be likened to a great caldron so filled with the macerated bones of whales that they not only bestrew its bottom, but also thickly incrust its rim to the farthest highwater mark. During the next few days I discovered that not King Edward Cove alone, but indeed the whole beach of the south fjord of Cumberland Bay, a shore line of more than twenty-five miles, is lined with an almost inconceivable number of bones, mostly of the humpback whale. Spinal columns, loose vertebræ, flipper bones, ribs and jaws are piled in heaps and bulwarks, and I could count seventy-five or one hundred huge skulls without moving from one spot. The region is one enormous sepulcher, yet no one can guess how many hundreds or thousands of flensed carcasses have been carried out to sea by the tide, and so have sunk their skeletons in the deep. Such reckless



The whaling brig "Daisy" at anchor in the Bay of Isles

waste of a material which when manufactured into fertilizer is worth several pounds sterling a ton, was due to the exceeding abundance of whales in South Georgia waters and consequent neglect of all products of secondary importance to the blubber oil. But now the companies are required by law to utilize the entire carcass of the whale, and they have either installed bone-boiling and guano plants at their stations, or have sub-let this branch of the industries to "floating factories," that is vessels especially fitted for the purpose. One of this type, a 2000-ton full-rigged ship, was so occupied at the time of our visit.

During our sojourn in Cumberland Bay the time was occupied with trips into the surrounding mountainous country, particularly about the magnificent west fjord of the bay, a section reached overland from Grytviken through a high, extinct glacier bed, parts of which are smoothly paved with small fragments of shale packed edgewise by the ice in the manner of a



mosaic. This pass is, curiously enough, the route taken by sea birds, particularly terns and skuas, in flying from King Edward Cove to the west fjord lakes. It seemed odd to meet flocks of terns 1700 feet up in the mountains. The summit of the pass is marked by a stone cairn from which the way descends abruptly on the west fjord side to the lake basins in the ancient moraine. There are five transparent lakes, no two on precisely the same level, and the largest nearly half a mile long. Intermingled with them are low, irregular hillocks covered with tussock grass, and at the sea-shore the land rises again, ending in bold cliffs.

In this attractive area it is but natural that the majority of the twenty-three species of birds which breed on South Georgia can be found. The native gulls, terns, titlarks, ducks and the larger Tubinares nest upon the ground, trusting the safety of their eggs to protective coloration, concealment or constant guard, but the lesser petrels nest in deep burrows in order to escape the predatory skua gull, the universal enemy of every living creature it can master. Extraordinarily populous among the many inhabitants of the tussock hillocks I found the petrel *Procellaria æquinoctialis*, the "black night hawk" of our sailors and "shoemaker" of the Norwegians. At sea I had often caught these birds, which exceed our herring gull in size, on pork-baited fishhooks. In the west fjord section they were nesting in burrows which they had dug through the frozen ground to a depth of a yard or more, using both feet and bill in the process, and the chatter or "singing" of the subterranean tenants, a pleasant and rather musical sound, usually revealed their presence before the nest entrances under the spreading hummocks were noticed. Early in December nearly all nests contained the single white egg which was often soaking in a pool of muddy water thawed out by the sitting bird. When drawn out of their holes the shoemakers screamed in an ear-splitting key and bit and scratched savagely, but if set free they squatted on the ground stupidly for awhile before taking flight. During the day many flew in from sea with a shrill whistling of their stiff wing quills, and I often surprised others apparently sunning themselves in front of their burrows.

The greater part of our stay at South Georgia was spent at the lonesome Bay of Isles, and at Possession Bay where in 1775 Captain James Cook set up his colors and claimed the dreary land for his king. At the latter place our anchorage was all but inclosed by a curving wall of valley glaciers the grandeur and proportions of which made them quite outclass the moribund glaciers of the Alps. The difficulty of working at these harbors was very great indeed because an ordinary camp outfit proved inadequate for the conditions encountered. South Georgia is a region of almost continuous violent gales, and my light tent was worthless. It was impossible to keep an oil stove burning within it, so that I suffered considerably from the cold while preparing bird specimens, and moreover the tent blew down frequently



SKUA GULLS FORAGING. BAY OF ISLES

The skua or sea hen (*Megalestris antarctica*) is the most aggressive bird of the far south, subsisting almost entirely upon other birds although it also eats carrion. In habits and plumage it resembles a buzzard hawk more than a gull



A blue-eyed shag (*Phalacrocorax atriceps georgianus*) brooding her young. In this beautiful species the ring of bare skin about the eye is cyanine blue. The feathers of the crest, back and wings are richly iridescent. The birds are of more gentle disposition than our northern cormorants and will allow themselves to be stroked while on the nest. Bay of Isles



The petrel called "black night hawk" by sailors and "shoemaker" by Norwegians at entrance of nest burrow. The burrows are dug through frozen ground to the depth of three feet or more. The chatter or singing of these subterranean tenants is a pleasing sound



King penguin (*Aptenodytes patagonica*) incubating its single egg. Bay of Isles. A king penguin carries its egg on the instep covered by a fold of the skin on the belly. The sexes relieve each other in the duties of incubation



A Johnny penguin (*Pygoscelis papua*) walking up to be chummy. The "Johnnies" are the commonest penguins at South Georgia; their eggs make an important food supply for the Norwegian whale-men. Temperamentally they are inquisitive, social with their kind, and quick to start a fight with one another

exposing everything to the snow and sleet. Eventually it blew to shreds. Very often blizzards made it impossible for a boat to leave the ship; and sometimes we were stormbound for three successive days.

Since the long-gone days of the fur seal harvest at South Georgia, when a hundred thousand "golden fleeces" a season were sometimes taken by "Argonauts" chiefly from Long Island and New England ports, the isle has been best known as a home of the sea elephant. The Antarctic species of this largest of seals differs markedly from the Californian race, and formerly had a circumpolar distribution. The great brutes being abundant as well as comparatively inoffensive and easily killed, a relentless pursuit of them was conducted wherever they could be taken on shore, or from Juan Fernandez southward and eastward to the Falklands, and throughout the isles of the South Atlantic and Indian oceans to the outliers of New Zealand. In many of its ancestral haunts the sea elephant has long since been wiped out of existence, but on South Georgia it had until recently a stronghold second only to Kerguelen Land. It is true that the heavy toll of "elephant oil" exacted of South Georgia in the nineteenth century brought the animals at several periods near the verge of extinction; there is a record that in 1885 the crew of a Connecticut schooner, which made a voyage thither in search of both oil and furs, were able to find only two sea elephants during a stay of ten weeks. But this example is perhaps without a parallel, and in any case sea elephants had been fairly abundant of late years in all suitable harbors and fjords of the island until three or four seasons ago. Since then the existence of the much persecuted animals has been threatened probably



Sea elephant rearing. In attacking, the bull sea elephants raise themselves until the fore flippers are clear of the ground and then hurl themselves forward



Sea elephant (*Macrorhinus leoninus*) worried by the ship's fox terrier. The great brutes when fighting can swing about very quickly by flinging their hinder ends into the air



A Parthian glance as he retreats. A sea elephant can progress for a short distance at the speed of a brisk walk. Note that the inflatable sac on the snout of this bull is collapsed because the nostrils are open

more seriously than ever before by the business-like and thorough ravages of one of the whaling companies which takes seal oil as a side line of whaling.

Soon after our arrival at South Georgia we began to fall in with sea elephants. As nearly as I can determine from my subsequent observations, filled out from the accounts of experienced sealers, the life history of these animals is very briefly as follows: The single "pups" are born on shore in early spring (September, October), and the old ones pair immediately afterwards while the young are nursing. For a period the adults then lie ashore, moving little and of course feeding not at all, while they grow gradu-



Sea elephant swimming at the surface. Bay of Isles. Usually sea elephants swim beneath the surface, gliding through the seaweed with great ease

ally thinner, supporting life upon their own plenteous blubber. The pups are more active, frequently entering the water and playing with one another in schools. They seem to be weaned at an early age, probably during November. After six or eight weeks the mature animals go into the sea where they feed, and may journey hundreds of miles, but on this part of their lives there is a gap in our information. A few slothful individuals continue ashore, and I have seen bulls of this sort in a state of pitiful emaciation, lying in wallows either alone or with four or five cows, as late as March first. Early in January well nourished adult sea elephants begin to "haul



A bull sea elephant. Bay of Isles

up" from the sea again, and as the month advances considerable herds of exceedingly fat females gather on the upper beaches. The males come later, during February and March, and are then of enormous bulk and very lethargic. These are the "March bulls" which sealers prize, for one such may yield five or six barrels of oil. They locate wherever they can find company, and if undisturbed remain in sleepy ease throughout the remainder of the Antarctic summer and the autumn. During the winter they divide their time between the land and the adjacent waters, and are in prime condition when they come ashore to stay during the breeding season of the following spring.

The attribute *par excellence* on which the sea elephant's reputation rests is large size. For a number of weeks after arriving at the Bay of Isles I saw no animal more than thirteen feet in length, except the dismal remains of bulls slain in former years. But during February, seventeen and eighteen-foot bulls, just out of the sea, were taken a dozen times, and on the last day of the month the record seal, twenty feet six inches long, was killed in Possession Bay. I did not see this huge brute until after it had been stripped of blubber, but as it measured twenty-one feet four inches (651 centimeters) while lying on its back in its flensed condition, the mate's flesh measurement is certainly not exaggerated. Our second largest bull was shorter than this by two feet. When the animals are in best condition (from a sealer's point of view at any rate) a large sea elephant's girth may very nearly equal its

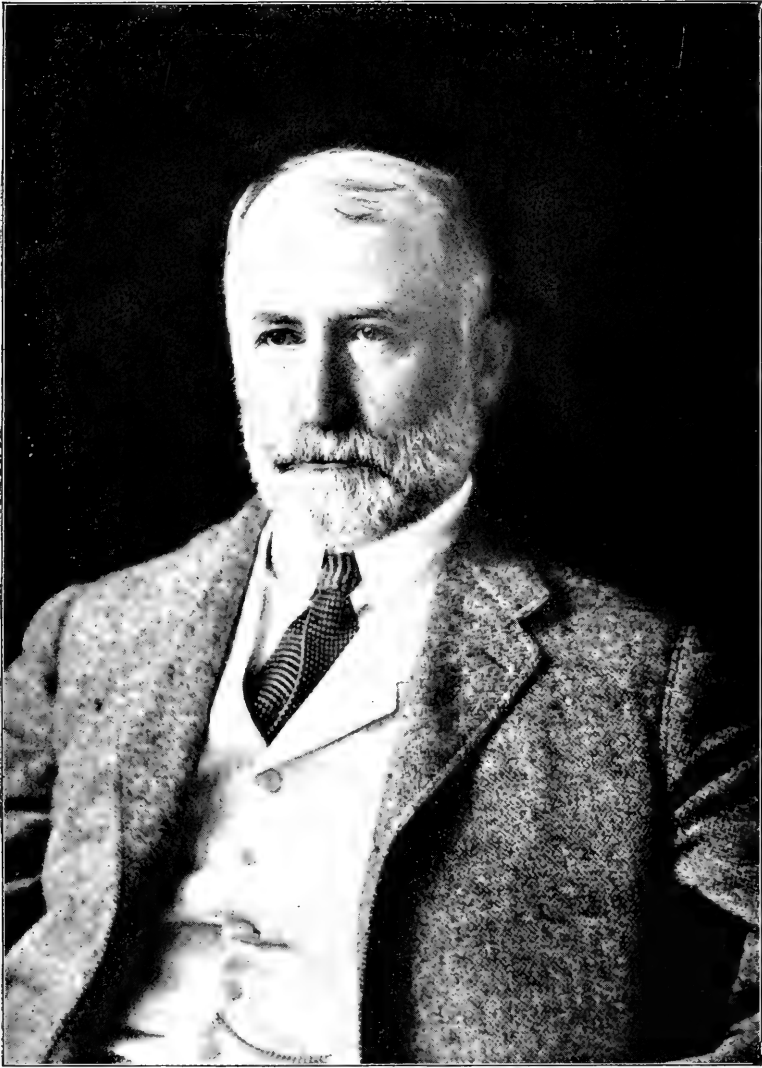


extreme length. The fattest I saw was a bull eighteen feet four inches long, and so round and distended that it had the appearance of being pneumatic, and inflated under high pressure. Seven men could barely turn its body over with the aid of ropes and hand holes in its skin, even after half the blubber had been removed and a trench had been scooped under one side of the carcass. The blubber was a trifle less than eight inches thick in the center of the breast, and the brute yielded almost as much oil as a young sperm whale. I gained a good idea of the weight of a sea elephant by cleaning up the skulls, for there was no man among the crew of the "Daisy" who could pick up and carry the head of a large bull until the hide and fat had been cut away from it.

The question as to whether the greatest of the seal kind is to be preserved at South Georgia depends largely upon the results of an investigation of the status of whales, seals and penguins, now being conducted for the British Colonial Office. The difficulties and expenses of the fishery make it almost impossible for any species of whale to become completely extirpated, however persistently it may be chased, but the unfortunate sea elephants have no such hope of preservation. Slow, unsuspecting, gregarious, they can be hunted profitably until the last one has gone to his ancestors and the calamity of the Antarctic fur seal is repeated.



A spectacled albatross (*Diomedea melanophrys*) or "mollymoke." South Atlantic. These birds are less numerous at South Georgia than the great wandering albatross



*By courtesy of Greaves Publishing Company*

#### THE LATE WILLIAM J. GAYNOR

William J. Gaynor, Mayor of the City of New York since 1909 and as such a member of the Board of Trustees of the American Museum of Natural History in its capacity as an educational institution of the city. Mayor Gaynor died suddenly on the "Baltic" on his way to England, September 10, 1913

"And I have got to that point where nothing said about me affects me much. Nothing that could happen to me would affect me much. I think I would be satisfied under most any circumstances. I think we all ought to feel that way—especially if you are going into political life, young men. Whatever God's will may be of me, I am content." *From address to Politics Club of Columbia University.*

"Consider that the great universe of which thou art only a trivial speck, is governed by fixed laws, and be therefore content in all things, and especially to die at any time, and abide God's will of thee, whether of individual future life, or dissolution into universal mind and matter." *From letter to Dr. Finley after reading Marcus Aurelius.*

# WILLIAM J. GAYNOR

MAYOR OF NEW YORK CITY, 1909-1913

AS is known not only to his own city but also to all great cities of the civilized world, William J. Gaynor, Mayor of New York, died suddenly at sea September 10. This man who because of his work as supreme judge and as mayor of New York City, will stand in the future history of the politics of America as one of its most forceful figures, honored the American Museum as a member of its Board of Trustees for the three and a half years of his mayoralty. To be sure Mayor Gaynor's engrossing political work through his interest in both city and national problems allowed him little time for consideration of educational questions — which is unfortunate, for it is certain that he would have brought to them the same quick grasp that he had for the core of a problem in law or politics, the same clear vision of means to end, and strong terse words and abundant courage for expression.

Mayor Gaynor however did not need to take active part in education to have influence there. He had a large influence because of his personal example. He was always a student. He continued reading the old and the new in law, history, philosophy — and his farm is practical proof of his interest in agriculture. This influence moreover will continue through his speeches and letters, a small number of which have just come in book form from the press of the Greaves Publishing Company.<sup>1</sup> What he has said in these letters will be remembered when what another man may have said is forgotten, for he did not choose words to please but to express fearlessly and effectively what he thought. It is a pleasure to quote the following from an address to the Politics Club of Columbia University, March 13, 1913:

.... See whether you are going into politics really from high motives or not. Are you going into politics to help the community or to help yourself? It is very easy to deceive ourselves. But my advice to you is to go into politics only after a firm resolve that your whole and only motive is to help the community in which your lot is cast. .... Do not give up your studies. Keep reading when you go out of here. If you are studying mathematics, continue the study of it. It is one of the greatest drills for the mind. I don't mind saying that I like now to take a problem of Euclid and pore over it and do it again, and think I am as smart at it as I was when I was your age, which of course I am not. And the same with your reading. Pick up especially works of the philosophy of history. There was once a great professor here in New York who wrote "The Intellectual Development of Europe," .... But read books like that. Read Lecky. Read Hallam. Read the book of Emil Reich, "Success among Nations." Read Green's "History of the English People." .... And then, of course, other books, like the Bible and Shakespeare, and works of autobiography, like Franklin and Benvenuto Cellini. .... You are not doing much more here than learning how to learn. Unless you acquire the studious habit here you might as well go home to-morrow. And do not be under the delusion that you can get to anything great in this world without preparation. .... Do not rely upon your genius. I know you are all geniuses. But nevertheless do not rely on it. It has been said by a man who has sense that genius is two per cent inspiration and 98 per cent perspiration. .... Get ready and you are a genius. But if you think you can do it without getting ready you are more fool than genius, I can tell you that. And you cannot do that without keeping up your thoughtfulness and your study. .... The saying is that no lawyer ever came to fame with a straight back or without a pale face. That tells the whole story. To be great in anything, you have to toil terribly, in the language of Sydney Smith. There is no other way to do it. You have got to pay the price; and if you are not willing to pay the price you cannot do it.

<sup>1</sup> MAYOR GAYNOR'S LETTERS AND SPEECHES. New York: Greaves Publishing Company, 1913.



*Courtesy of American Press Association*

**CROCKER LAND EXPEDITION — CHAIRMEN OF COMMITTEES AND STAFF**

Upper Row, left to right—HENRY FAIRFIELD OSBORN, EDMUND OTIS HOVEY, DONALD B. MACMILLAN  
Lower Row, left to right—HARRISON J. HUNT, MAURICE C. TANQUARY, W. ELMER EKBLAW, FITZHUGH GREEN, JEROME LEE ALLEN

# CROCKER LAND EXPEDITION

REPORT BY DONALD B. MACMILLAN, LEADER

THE sealer "Diana," carrying the Crocker Land expedition with Donald B. MacMillan, leader, sailed from New York July 2. The first port of call was Boston, where she took on additional supplies, among which were seven tons of pemmican. The second port of call was Sidney, Nova Scotia, where the supplies were increased by twenty tons of dog biscuit and several hundred tons of coal.

When the "Diana" sailed out into the Strait of Belle Isle July 12, she encountered much ice and finally dense fog. The difficulties of navigation became very great and on the morning of July 17 the ship was wrecked on the rocks off Barge Point, Labrador. This did not prove a great disaster for the expedition however. The whole party and all the supplies were transferred to the steam sealer "Erik" of St. John's and on July 31 the start was again made for the north with only a brief stop at Battle Harbor, necessary to take on board the thirty-foot power boat, the "George Borup," before the ship cruised direct for Cape York.

On August 5 many icebergs of great size came in view and at night all was obscured by fog. The days passed with slow progress between giant icebergs and through impenetrable fog until August 14 when the fog lifted and to starboard lay the coast of Greenland, and the expedition had its first view of the midnight sun. On the next morning the "Erik" touched shore at the southernmost village of the Innuits, then steered on along the coast past North Star Bay where the Danes have established a mission and erected a shelter for meteorological instruments, past the village of Oomenoee where three Eskimo were engaged, on past Inglefield Gulf and Igludahoming. This village where three more dog-drivers were engaged, is made up of but six tupiks on a meadow sheltered by storm cliffs and covered with the golden poppies and dandelions of the Arctic. The following which carries the story to August 30 is quoted from the report cabled to New York by Mr. MacMillan:

"We left Igludahoming August 18, for Nerky. Everywhere we found the Eskimo thriving, prosperous and healthy. They had already laid in ample supplies for winter, despite the fact that most game is scarce this year, particularly the walrus and eiderduck. Narwhal and seal are relatively abundant.

"From Nerky the 'Erik' steamed on to Etah, our last stopping place before crossing to Ellesmere Land. Here we stayed until Thursday afternoon, detained by great fields of ice in Smith Sound. Etah is a place famous in Arctic explorations, and in its sheltered harbor many ships have found safe anchorage. We took on more Eskimo here. We have now on

board eight good dog-drivers, with their wives and families, a total of twenty-six Eskimo and eighty dogs and twenty-five pups. These dog-drivers are among the best in the tribe. They improvised little igloos on deck for their families from our boxes of supplies in the main hold. They must have inherited some of the skill of our prehistoric cave-dwelling ancestors. They put their kayaks up on the stays, from which they could easily put them overboard when they wished to go after a narwhal or a walrus.

"With Etah as our base, we bucked the ice in Smith Sound for over a week, embracing every opportunity that promised a way across to Cape Sabine and retreating to the harbor whenever the closing ice threatened to crush our ship, there to stay until our watch on the mountain back of Etah should report a favorable lead widening toward Ellesmere Land. Every lead that promised ingress to Flagler Fjord, where we had planned to establish our headquarters, was eagerly followed through our glasses.

"From the barrel at the masthead the members of our party took turns at the watch, but in vain. We were even unable to approach within fifteen miles of Cape Sabine or of Payer Harbor on Pim Island, where we might have established a base from which it would have been relatively easy to prosecute our explorations and scientific research, though with less dispatch and certainty of accomplishing all we hoped to do. On our latest attempt we encountered a massive pack that extended without break from Lyttleton Island to Cape Sabine, studded with colossal floes and massive bergs. This impenetrable barrier extended as far back into Kane Basin as the vision could attain with the most powerful glasses. An unfavorable wind was packing all the drift ice against the barrier. The most optimistic among us could not detect a ray of hope that a passage would open this year, and we reluctantly abandoned our attempt to cross to Ellesmere Land and turned the ship back to Etah.

"Thus Etah becomes the headquarters for the Crocker Land expedition. On the site of Peary's old base we have unloaded our supplies and equipment and begun the foundation of the house which is to be our home for the next two or three years. The 'Erik' was laid up along the rocks, and everything except our lumber unloaded directly, without the aid of boats, about a quarter of a mile from the site of our house.

"The site we have chosen offers the maximum comfort and convenience attainable in the North. Its only drawbacks are a restricted view of the sea, a rocky shore to land our boats and a doubtful position for our wireless aërials. Its advantages are a sheltering protection from the cold winds of the north and east, accessibility to water hunting-grounds and the sea, proximity of Eskimo to assist us in our work, full exposure to the sun whenever it shines, favorable conditions for valuable scientific work and an accessible gateway to the Greenland ice cap, which we hope to explore before next summer. Altogether Etah is perhaps the best possible site on the Green-

land coast for our purposes, though not at all comparable with Koldewy Point, on the Bache Peninsula of Ellesmere Land where we had hoped to be.

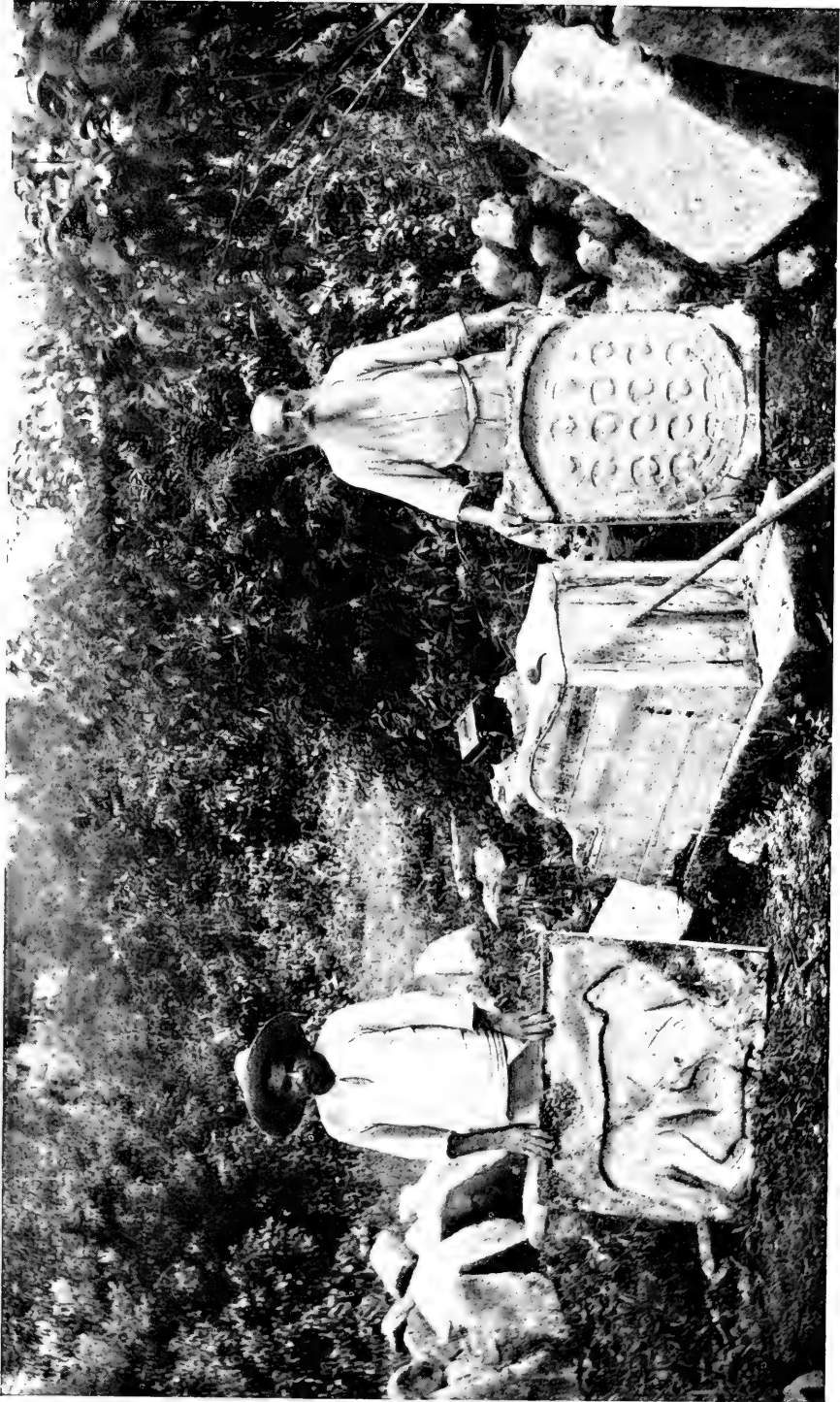
"Reluctant as we are to give up our plans to winter on Ellesmere Land, the near approach of winter and the long night, the vast amount of work before us, the uncertainty that Smith Sound will be open this year and the dread that the 'Erik' should be frozen in, with the consequent necessity of feeding the entire ship's crew for ten months from the provisions intended only for our party, all forced us to the decision to go into winter quarters on the Greenland coast without further delay.

"Our entire party is in good health, optimistic and determined to make the most of our bad fortune in not attaining Ellesmere Land this year. All are eagerly at work building our house, storing our supplies and arranging for the winter's work. Every one realizes that there is much to do and a limited time in which to do it.

"Snow has already fallen twice since we came to Etah and ice freezes on the harbor nearly every night. The birds are migrating southward and the Eskimo making their final preparations for relinquishing their life in the tupiks for the warmer interior of the igloos. The chill and sternness of the great North have already settled down upon the plateaus, for upon them the streams are even now frozen dry with the temperature falling to 22 degrees Fahrenheit. There can be little doubt that the Greenland autumn is far advanced and that winter is not far distant.

"The 'Erik' will leave us as soon as she has taken on ballast and water and been made ready for the voyage south. With her will go Judge Carroll Sprigg and Fredrick B. Patterson, of Dayton, Ohio, who accompanied us as tourists and who we wish might stay with us. They have endured the misfortunes, inconveniences and unpleasantnesses of the voyage as good sportsmen and we are loath to lose them. After we bid them goodbye, and they and the 'Erik' are gone, we shall again turn our faces to the work and problems before us, alone except for the gentle, patient, little brown people, the Innuits who will help us. We greet you all who have helped us, all who are interested in our welfare and think of us, and then the North claims us."

Judge Sprigg and Mr. Patterson returned to civilization giving an enthusiastic report of their trip to Etah with the expedition. They repeat the story cabled by Mr. MacMillan, that the fight against the ice was hopeless and return to Etah necessary. This practically reverses the plan for the three years' work, putting the exploration of the Greenland ice cap for next summer instead of the summer of 1915 as scheduled, and deferring the search for Crocker Land until this later time.



PIETRO GRISANTI, EXPERT MOLD-MAKER

The photograph shows a mold of the shield and the jaguar which constitute the design in the frieze of the Temple of the Jaguars. [Compare with photographs on pages 272 and 280]



# THE TEMPLE OF THE JAGUARS

REPORT OF WORK PRELIMINARY TO THE REPRODUCTION OF  
THE FRONT FAÇADE<sup>1</sup>

By Edward H. Thompson

ONE of the most important archæological problems of the day is that of the ruined cities, vestiges of an ancient American civilization, that lie strewn over the surface of the Yucatan peninsula. Who were their builders and where did these builders come from are among the queries of to-day as they were in the days of Stephens, Von Humboldt and Brasseur de Bourbourg.

Whether the ancestors of these ancient builders with their undecipherable glyphs, their ornaments and tools of jade, came from Asia by the way of Behring Strait, were broken branches of a lost Atlantic stem, or grew up by gradual evolution from purely indigenous roots we may not yet know, but we do know that in times ancient even as science now interprets the word, civilized races were born in the Americas, that these races lived out their days and then sank back into the dust from whence they came, leaving faint traces of their having been, to mock our ignorance. No one wise in the knowledge of these things even thinks to name, much less to fix by time, the origin of these most ancient, long-forgotten and temple-building races of America.

The last of these earlier races was the one from whose fast-dying fires the Aztecs and allied people kindled the fierce flames of their civilization. This earlier race, call it Toltec if you will, was probably the one that built the now ruined cities of Yucatan of which Chichen Itzá was the great mother city.

Chichen Itzá was the largest and most important ancient city on the peninsula of Yucatan, if not indeed over the whole area, influenced by that distinctively American civilization that students now call the Maya. Its great pyramid temple with its four broad stairways and nine parallel terraces rises from the midst of a man-made plain and looms against the sky in massive grandeur. Seven other structures still rear their sculptured walls, defying time, and hundreds more lie prostrate, their carved stone walls and what were once their chambers now but shapeless heaps of stone, lime and fallen columns.

<sup>1</sup> Mr. Thompson was engaged by the Museum to make molds for a full-sized model of the ruined Temple of the Jaguars in Yucatan to be erected as an architectural feature of the Columbus Avenue entrance to the Museum when that extension of the building is erected. He owns the site upon which the temple stands and has long been a student of the ancient architecture of the Maya race. In addition to the molds Mr. Thompson has prepared drawings and selected photographs all of which will make it easy to reproduce this aboriginal masterpiece.



#### TEMPLE OF THE JAGUARS

This temple is some five hundred feet to the west of the pyramid temple. The entire front has fallen outward over the twin serpent columns [See cut page 266] which acted as levers, to be hurled over the edge of the temple platform into the Ceremonial Court thirty feet below. It is this fallen façade — a huge mass of masonry, broken stone and lime compacted to a cement-like hardness by years of exposure and covered with centuries' growth of trees — that the American Museum hopes to reproduce in its original beauty. All accumulated débris was cleared from the temple platform and surfaces unfamiliar to modern students were laid bare. The steps of the wide stairway have the narrow treads (8 in.) and high risers (12 in.) characteristic of sandal-wearing people. A large stone plate with paneled carving rests at each side of the stairway directly below the point formerly occupied by a carved stone serpent head. These heads were found during the excavation [See page 271]



#### PYRAMID TEMPLE OF CHICHEN ITZÁ

Pyramid temple with four broad stairways and nine terraces. Chichen Itzá was the mother city in that prehistoric civilization that students for convenience sake now agree to call "Maya." No one tries to name or set the time exactly of these building races of Yucatan. Of this city seven other structures, among them the Temple of the Jaguars, still rear their walls while hundreds lie as shapeless heaps of masonry

Five hundred feet to the west of this pyramid-temple but on the same great terrace, rest two huge moles of masonry, stone-faced, each 274 feet long by 30 feet high and 30 feet thick. No lines of cornice or bands of ornamentation interrupt the sheer vertical walls, but high up the inner wall surface, two large stone rings once projected, one on each side and each opposite the other. One of these has been broken from its place and lies on the ground beneath, but the other still remains firm and projects boldly from the sheer surface. Between these two moles is a level space 121 feet wide, called the Ceremonial Court. These stone rings and the Ceremonial Court were probably used in the performance of sacred rites and in games of a religious character.

Upon the southern end of the eastern mole rests an edifice that is in many respects the most interesting of all the structures still standing. It is called the Temple of the Jaguars, from the remarkable frieze or band of well-carved jaguars that alternating with shields, once extended around the temple walls.

Below the temple proper which is two-chambered, the remains of what was once a third chamber is still visible, facing the east and resting directly upon the level surface of the great ground terrace. A large portion of its walls has fallen but upon the portions of wall surface still standing can be seen carvings in low relief of intense interest.

The inner chamber of the

structure above, that of the temple proper, has its walls as yet almost intact and they were once completely covered with mural paintings depicting domestic scenes, early migrations and war forays. Nature however has passed her erasing hands over large portions of the smooth wall surfaces and vandal man has proved more pitiless than Nature in defacing the works of the ancient artists, yet even so, enough remains to make this chamber the repository of what is probably the finest examples of this class of mural paintings yet left to us for study and comparison. The walls of the outer chamber were once covered with paintings but of these not a single legible outline remains. The great twin columns fashioned into the conventionalized forms of serpents still hold in the deeper carvings and cavities, like those of the mouth and the bulbous teeth, traces of the pigments that once covered the surfaces of columns and chamber walls.

The entire front of this beautiful structure, as chaste and artistic in its own way as the temples of Greece and Rome, has fallen. Fractured and wrenched apart by the growing tree roots at the apex of the roof, the weakest point in all the structure, the overweight of the heavily ornamented façade caused the whole mass to fall outward, and turning upon the two serpent columns as upon gigantic pivots, to be tossed nearly clear of the temple platform, crashing down to the hard and level space of the Ceremonial Court full thirty feet beneath.

This façade with its beautiful frieze of carved stone figures, graceful meanders and noble proportions, it is hoped to reproduce in as nearly as possible its pristine state. It is an undertaking much in line with the desires of the late John La Farge, who with me had long felt the wisdom and necessity of incorporating in some definite way the ideals and fruits of these ancient distinctively American architects into what is fast becoming our own modern distinctively American architecture.

For these reasons I not only felt greatly honored by the action of the high authorities of the Museum in confiding to me this important undertaking, but I also felt that I had a double charge and a double incentive, inasmuch as in so doing I was aiding in the fulfillment of the dead artist's dream and in my own hopes as well. Such measure of success as I may have attained must be attributed more to these incentives than to my own merely personal abilities.

Proceeding to Yucatan I attacked the task with enthusiasm. My previous experience in reproducing the "Labna Façade" and in the still more important undertaking at the World's Fair in Chicago aided me greatly in working out the problems and overcoming the obstacles in this task.<sup>1</sup> Then too the efficient aid of my oldtime companion in the field, Pietro Grisante, the expert plaster-mold maker, was to be at my service and I knew how much I could rely upon him.

<sup>1</sup> Official Report Mass. Board of Managers, World's Fair, page 161.



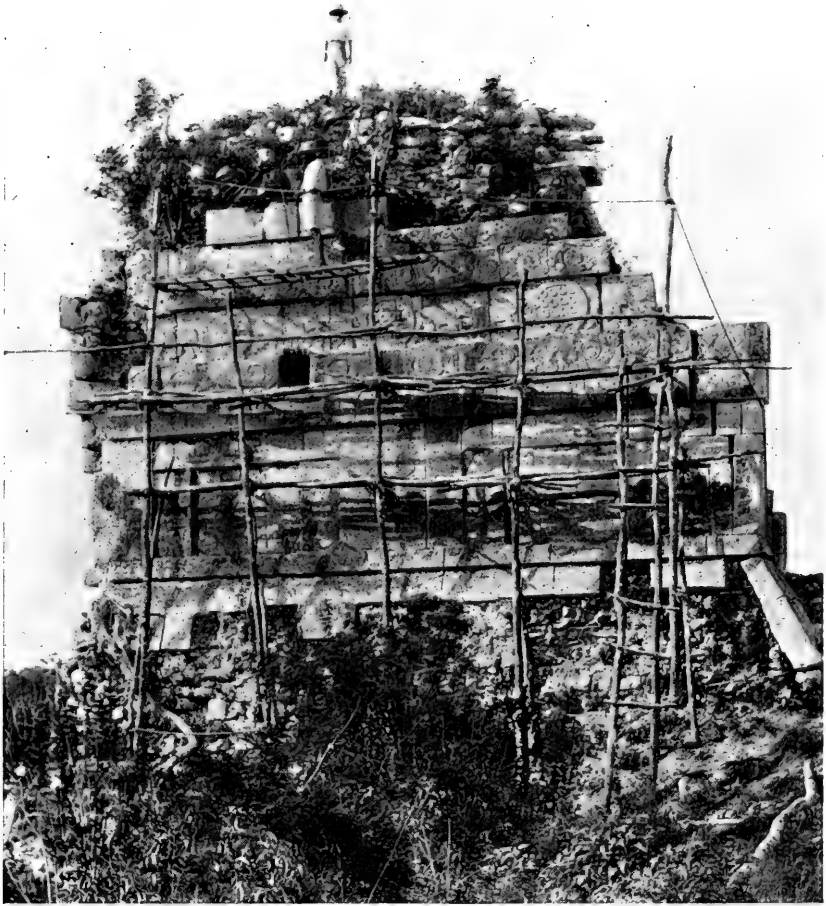
Five hundred feet west of the pyramid temple are two moles of masonry, 274 feet long, 30 feet high, 30 feet thick. The space between (121 feet wide) was probably a ceremonial court used for celebration of sacred rites and games. Upon the southern end of the eastern mole rests an edifice called the "Temple of the Jaguars"



A beautifully carved serpent head that we came upon in the excavating



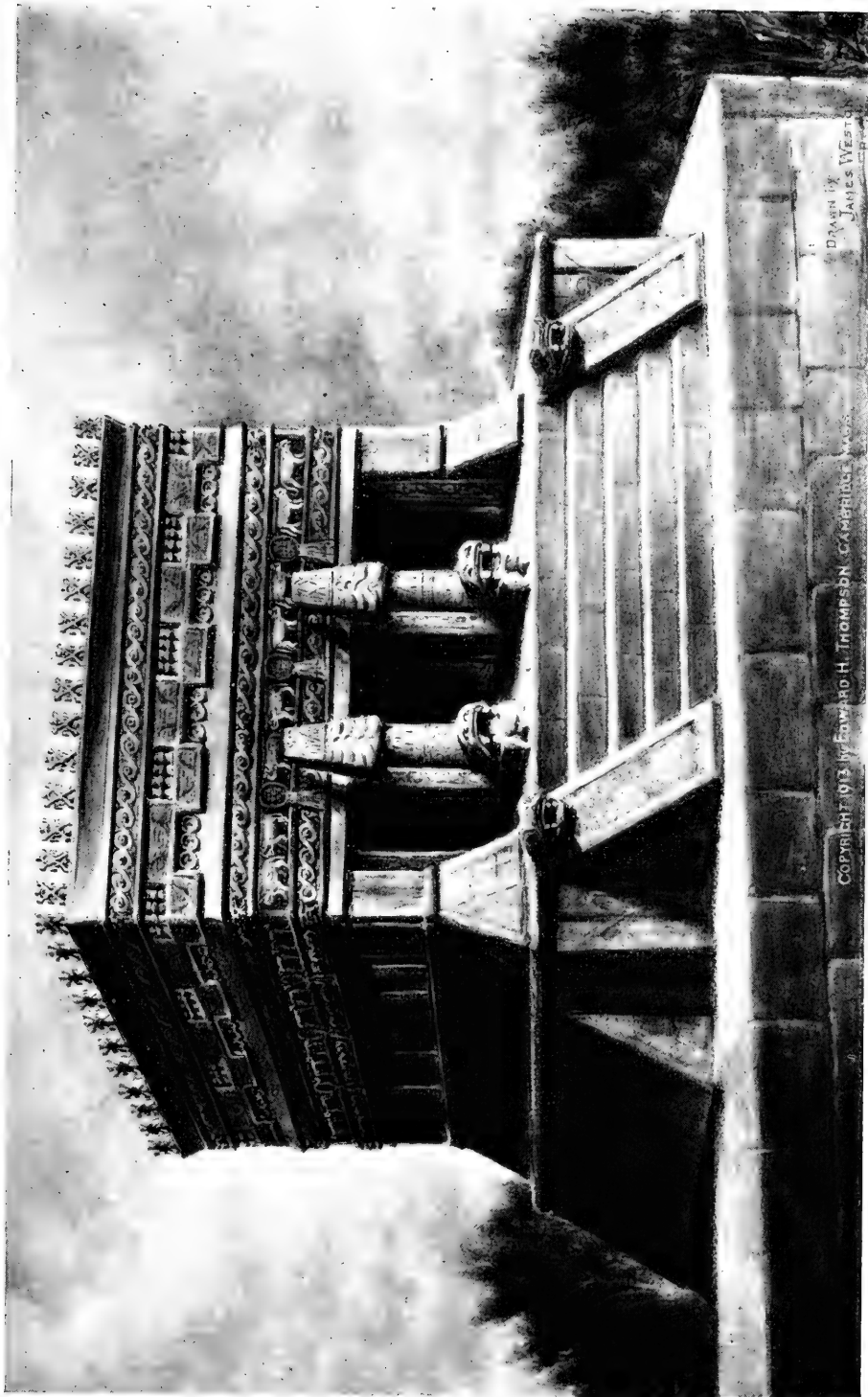
Façade portions uncovered. Every cubic foot in the fallen mass was gone over and not a fragment however small was thrown aside without careful examination



The paper molds of the carvings still in place had to be made from a scaffolding of large and small poles bound together with ropes, native fashion. Some danger attended the work because of the disintegrating condition of the walls and the continual movement and shaking of the scaffolding which swung fully fifty feet above the temple terrace. Once we had the work done and the paper molds ready to be dried by the hot sun when a storm arose and the wind whipped our tarpaulins aloft like so many handkerchiefs and scattered the molds in bits far and wide

The greater portion of this once beautiful façade lay in a huge mass of masonry, broken stone and lime, over thirty feet below the front platform of the temple. The commingled mass had become compacted by rain percolation and time pressure into a cement-like hardness. Over this had accumulated a thick blanket of vegetable mold and trees had grown as huge as those of a forest primeval. Their rotting trunks were still visible and their myriad roots yet bound the stone masses as if with bands of iron.

The work commenced by the clearing off of all the superficial accumulation and débris upon the front chamber floor and the platform of the temple. In so doing we came upon mementoes of earlier workers in the field. A long



DIAGRAMMATIC DRAWING OF THE TEMPLE OF THE JAGUARS

It is planned to use a restoration of the Temple of the Jaguars as an architectural feature of the Columbus Avenue entrance of the American Museum 273

narrow break in the floor evidenced the trench that the tireless student Dr. August Le Plongeon dug when he interred the fourteen Atlantean figures to keep them safe from vandal hands. An empty marmalade can was the souvenir left by Mr. A. P. Maudslay, now president of the Royal Anthropological Institute of Great Britain, and I was almost ready to affirm that it was the same can that I helped him to empty nearly a quarter of a century before. A daintily marked crystal flask that once held citrate of iron, could only have been the property of Miss Adèle Breton, the gifted artist-student whose copy of the mural paintings within the inner chamber of this temple are as beautiful as they are exact. Other finds were of other later visitors but more prosaic and so less interesting.

With the cleaning off of all this modern and near modern accumulation, the steel probe, the whisk broom and the trowel laid bare surfaces and outlines untouched by modern students. These were followed up until the full original outlines of the entire front platform were clearly defined and worked out.

Carefully disposing of the accumulation removed, that it might not fall upon and so disturb the true sequence of the material below in which excavation was to be made later, the carved stone work to the right and left of the wide front stairway and the entirely new carvings brought to light by this clearing were all carefully cleaned, photographed and measured as preliminary processes to that of making the molds of plaster or of paper. It was found that the wide stairway in front of the temple platform consists of four steps (excluding the base and platform planes) each twenty-seven feet long with an eight inch tread and a twelve inch riser. These narrow treads and high risers are characteristic of a sandal-wearing people.

To the right and left of this stairway and binding it in place are large stone plates, one on each side, and each plate has upon its face a paneled carving. Beyond each of these stone plates which are inclined at the same angle as the stairway, are recessed walls slightly inclining from the vertical inward toward the temple. The wall on the left looking from the temple entrance is still in place although portions of the handsome stone slabs are missing but of those on the right, only the terminal post is visible and that is lying mutilated and prostrate. Probably the fall of the façade mass pushed the stones from their places and broke them into unrecognizable fragments on the hard surface far beneath.

It was during the excavations of this mass of accumulations upon the front platform of the temple that we came upon evidence of the fact that the two beautifully carved stone serpent heads found later in the fallen masses below, when in their places rested one on each side of the stairway and directly over the paneled and carved stone plates.

The symbol of the feathered serpent seems to have been to the New World races what the cross was to the Old World. The origin of both as religious symbols is buried in mists of antiquity so dense that modern man



may not hope to penetrate it. Both the Maya and the Aztec had their culture heroes, Kukulcan or Quetzalcoatl, whom they first deified, then surrounded with the aura of still more ancient sun myths, and endowed with attributes common to the beliefs of an agricultural people in regions where the beneficent rains are eventualities.

That the religious ideals evidenced by these symbols permeated the very lives and influenced every action of these ancient builders is clearly revealed by the symbolism of this feathered serpent that in its varied and conventionalized forms is ever present on structural base, carved approach and wall



The largest and most typical of all the serpent columns discovered in these ancient cities of Yucatan. This is one of the twin columns which formed the central supports of the fallen façade. Color in the crevices proves that they were painted. The feathered serpent as a religious symbol seems to have been to the New World what the cross was to the Old. It is found everywhere in architectural ornamentation from structural base to carved approach and façade

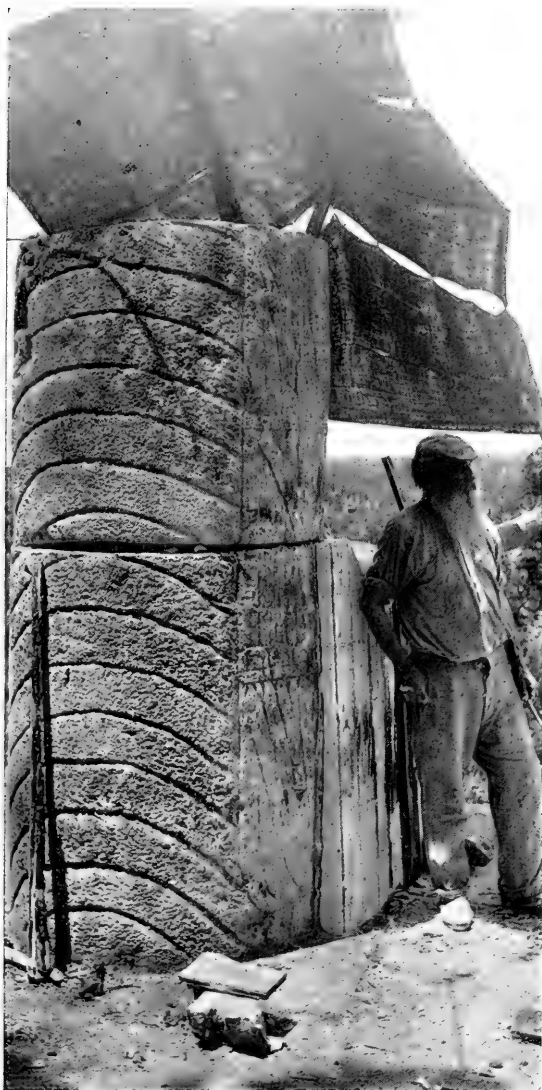
façade. The motive of the feathered serpent becomes therefore a highly important factor in the analysis of their work and the development of their ideas.

The twin columns that formed the central supports of this façade to be reproduced are the largest and most typical of all the serpent columns yet found among the ancient structures on the peninsula. The serpents' heads are over three feet six inches measured between the crotalid plates, four feet three inches high from base of lower jaw to crown of crotalid plate, and seven feet long from front of jaw to outer angle of the neck. The column proper from base plane to capital is eight feet two inches, the thickness of the capital is two feet, two inches, while the upper flare of the tail is fully four feet. The whole column is well carved, artistically covered in front with the flowing plumes of the quetzal bird. The crotalid head with its pronounced crotalid plates above the eyes, has all the distinctive marks of the crotalus or rattlesnake, but conventionalized through centuries of religious idealism. The inner back of the column corresponding to the belly of the serpent is marked with segments, like the serpent scales, but even these are sparingly overlaid with the smoothly flowing plumes of the sacred bird. The tail conventionalized into the capital has its front thickly covered with the plumes of the bird, while the surface underneath is carved into the conventionalized segments of the rattlesnake. Fragments of both tails lie scattered among the débris at the foot of the mole, beneath the temple for a distance of thirty feet or more. Portions of the rattles were found over three feet long, but large parts of both tails are so crushed and broken as to be unrecognizable. Enough has been secured however to make restoration possible.

The huge beams of Zapote wood that passed from end walls to the serpent columns and so helped to sustain the front façade, have entirely disappeared, and any hopes that I may have had of finding them among the fallen material were doomed to disappointment. It may be that they too were carried off to fill another purpose, either by Valladolid æsthetics or by even earlier vandals, for their dimensions would not have escaped notice.

The work of making the paper molds of the carved stone sections still in place on the temple platform and those still in place on the north façade was attended with some danger and much difficulty but great interest. The highest line of carved stones still in position was fully fifty sheer feet above the level of the general terrace. From the temple base on the level of the mole platform, large and heavy poles were bound together, as the natives well know how to do, while strong ropes held them upright and fast, and so permitted the framework of the scaffolding made of smaller poles to be erected. On this moving, shaking, yet perfectly safe scaffolding of poles, with not a nail or spike in the whole structure, we worked and made the molds.

The element of real danger was furnished by the disintegrating wall material and the loose stones of the grouting. These stone fragments were some of them quite large and had been placed by the ancient builders in the plastic mass of grouting much like the nodules in the pudding stone. The



Making the molds in a temperature of 130° F. was no easy task. The photograph shows the mold of the head completed. [The serpent tail capital weighs nearly three tons

softer mortar wearing away with the erosion of the centuries has left the stones outcropping, at times falling of their own weight and always a constant factor of danger to those working beneath them. Then too the high winds and rain storms that prevailed at this season, while they aided the growing crops and made the luxuriant vegetation, also increased the difficulties of the undertaking in hand. Once we had the work on the northern façade all done, and well done it was too. The long sections were duly marked and noted, nothing remained but the hot sun to do its part in drying and hardening the plastic paper surface. Even while we were looking at it with tired backs but satisfied hearts, black cloud heads appeared in the east, they rose rapidly and hid the sun. We at once put the heavy tarpaulins over the molded surfaces fixing them in place by the iron force-

hooks, spreading clips, and screws especially made for the purpose. No use! for when the strong wind came it whipped the tarpaulins aloft, torn and split like so many handkerchiefs, while the drying paper molds once lying so smoothly and trim on the carved stone surfaces, were scattered far and wide as bits of paper over the tree tops.

The work was once more completed and this time Nature was in a more lenient mood. The sun did its work even as we did ours, and in the proper time, the molds duly prepared and rendered impermeable to moisture by



The completed sectional mold of the serpent column. Note the many pieces tied and wedged to await the drying and trimming process. Each separate piece weighs several hundred pounds. For shipping to New York the molds were packed with dry *xkusac* grass in cases of *xpasac* wood which had been cut in the forest and dried in the hot sun for months

varnishings, were packed and so made safe against all ordinary dangers and mishaps.

The description, delineation, measurements and molding of the façade portion still in place, and so capable of serving as guide in the restoration of the fallen façade, having been completed, the rest of the report deals with the accumulated material on the floor of the Ceremonial Court. Every cubic foot of this immense mass of fallen material must be carefully gone over, not a stone fragment however small is to be thrown aside without having been carefully examined.

The dimensions of the fallen façade having been determined, the zones of varied designs on the northern façade portion still in place, were measured, numbered and given names. For example: the "Frieze of the Jaguars and the Shields" was analyzed and its intent studied. By computation it was found that the frieze, if of unbroken continuity in front, should hold three shields and eight jaguars. In time the three shields were found, no more and no less; and enough jaguars or fragments of jaguars to complete the required number, thus the continuity of design on that line of frieze was logically established, and so on with the other bands. This was the task in the round. The problems involved were many and varied, the mere molding of the carved stones found being among the least of them.

Not only were the factors of displacement, fracture, and actual demolition to be considered, but others not subject to the natural laws of falling bodies. For instance, some time between 1721 and 1840, corrals were built and drinking troughs made on the plantation of the Chichen from stones some of which certainly were and others may have been taken from the falling façade. Again, during the middle of the last century, a strange microbe seems to have invaded the brain of a *Jefe Politico* of the City of Valladolid, some thirty miles distant, and under its influence he sent carts and men to Chichen Itzá and took therefrom carved stones and serpents' heads, to adorn the plaza of Valladolid, and some of these at least came from the level space of the Ceremonial Court. As the carts went on through the forest road toward Valladolid some broke down under their heavy burdens and their contents still lay in the forest where they were dumped. Later, half a century later, some of these carved stones that did reach Valladolid were once more removed, taken to the *Museo Yucateco* at Merida, where they now are. All these incidents and many others not necessary to mention, made the task by no means an easy one, but for that reason the more fascinating.

The methods by which the undertaking has been accomplished, the details by which the final result has been obtained, are so varied that much of the original monotony of such hard labor was missing, and the interest of even the slowest-witted native on the work so awakened that they often of their own volition continued lugging and hauling, digging around some



An assembled carving made up of eight fragments which had been thrown apart at the time of the great crash centuries ago



The temple gains its name from a remarkable frieze of well-carved jaguars alternating with shields. This cut shows one shield and a portion of a second, and three jaguars [Compare with cuts pages 266 and 272]. Study of this façade still in place and computation of the dimensions of the fallen façade gave the conclusion that the frieze of the latter must have held three shields and eight jaguars. Exactly this number was found during the excavation

especially interesting carving, long after the hours when they would usually be swinging in their hammocks, in the cool shade of their palm-thatched homes.



Some particularly interesting carving would be unearthed — a little turning over in the hand, the fragment would fit into its place with other fragments and the workmen would go on with the digging

The tree trunks, matted roots and all the surface accumulation of centuries were carefully removed so as not to disturb the sequence, nor yet



The natives proved faithful workmen and became so interested that they often remained many hours overtime at the digging

to dislodge the delicate portions of carvings that the long, slender yet tenaciously strong rootlets might have grown into and wedged apart metres deep in the mingled mass of disintegrated mortar and worked stone sections.

Long years of experience with my work, have made good practical archæologists of some of the workmen, not a fragment of carved stone, however small, within reason of course, escapes their keen eyes — a preliminary fumbling, a little turning over in the hand, a speculative eyeing of a

nearby fractured carving, and then the fragment fits into its place while the workman with a grunt of satisfaction goes on with his digging.

The making of the molds with the temperature at 130 in the sun and no shade available, is not precisely a recreation but all things that have a beginning have an end as well, and in time in spite of the obstacles seen and unforeseen, the undertaking was completed and the final processes of trimming, binding and waterproofing the paper molds commenced. Then the trunks of *xpasac* wood, that had been cut in the forest and drying for months, were sawn into inch boards and made up into strong wooden cases according to the measure of the various mold sections. Large quantities of *akusac* grass, a very fine packing grass, had been cut, cured and stored, and with this the heavy plaster molds were packed so carefully and so securely that it seemed as if they could defy the efforts of the most reckless baggage-smasher and freight-wrecker.

Careful cartage over the rough frontier roads and careful handling under personal supervision at the port of Progreso, made more than probable the safe arrival of the twenty-seven large cases containing all the molds, both paper and plaster, to the store-rooms of the Museum, where they now lie *á la disposición de Ud.*





# THE ROOSEVELT EXPEDITION TO SOUTH AMERICA

NEWS OF THE MUSEUM'S OTHER SOUTH AMERICAN WORK

By Frank M. Chapman

THE Museum's zoölogical explorations in South America, which during the past two years have produced such interesting results in the northern parts of that continent, now promise to be even more effectively prosecuted in southern South America, under the leadership of Colonel Theodore Roosevelt.

Colonel Roosevelt will sail for South America on October 4, and after delivering lectures in Rio de Janeiro, Buenos Aires and Santiago de Chile, will penetrate the interior of southern Brazil to study the country, its mammals and birds. There is no big-game hunting in the region which Colonel Roosevelt proposes to visit, and his expedition serves to emphasize his keen interest in natural history even more strongly than did his recent trip to Africa. Mr. George K. Cherrie and Mr. Leo E. Miller, both tried members of American Museum expeditions, will accompany Colonel Roosevelt as field assistants.

THE mountainous region at the headwaters of the Orinoco is, zoölogically, one of the least known areas in South America. Various attempts have been made to penetrate it but the obstacles presented by climate and transportation have not been wholly overcome.

Mr. L. E. Miller, who recently headed an American Museum expedition to this *terra incognita*, has more nearly achieved success than any of his predecessors, but through no fault of his, he was obliged to retreat just as he was about to reap the reward of two months' constant exertion and exposure to the dangers incident to travel on the Orinoco.

Mr. Miller, accompanied by Mr. F. X. Iglseider, as assistant and cartographer, left Ciudad Bolívar on December 17, 1912, in a small sloop bound for San Fernando de Atabapo. After a number of narrow escapes and the loss of one man, this remote settlement was reached January 28. On February 3, he reëmbarked with a mandioca-hunter, whom he was fortunate enough to encounter, for his destination, Mt. Duida, farther up the Orinoco. This mountain being unscalable from the Orinoco side (site of the now abandoned village of Esmeraldas), it was proposed to attack it from the west by ascending the Cunucunuma, a small river which flows into the Orinoco about twenty miles west of the junction of the Orinoco and Cassiquiare, and on March 4, camp was established at Boca Sina, some eight miles from the mouth of the Cunucunuma, and but two miles from the base of Duida.

Work was now begun on a trail through the forest to the mountain, but before it was completed Mr. Iglseider fell desperately ill with a complication of beriberi and malaria, and in order to save his life Mr. Miller was compelled to return with him to San Fernando and eventually to Cristóbal-Colón.



EXPLORATION IN SOUTH AMERICA

Unloading equipment for transportation around falls in the Orinoco. Expedition of Mr. L. E. Miller

Some four hundred birds were collected on the upper Orinoco, but none were taken above an altitude of seven hundred feet at the base of Duida and the fauna of the mountain still remains unknown. Mr. Miller will probably renew his attempt to conquer it and the receipt of further collections will be awaited before attempting to report on the specimens already obtained. Six hundred specimens were secured at Cristóbal-Colón including a surprising number of species not found in Trinidad.

From Cristóbal-Colón on the Paria Peninsula (which was attacked by revolutionists shortly after Mr. Miller left it), Mr. Miller proceeded to Port of Spain, Trinidad, whence his collections were shipped to New York, and proceeded thence to Georgetown, British Guiana. Here he was greatly assisted by government officials in procuring the necessary permit to collect specimens and was soon established at Tumatumari near the junction of the Essequibo and Potaro Rivers. Under date of August 1, Mr. Miller reports that the surrounding primeval forests were proving most productive collecting ground and that in spite of a daily rainfall of between two and three inches, his collections were growing at the rate of about two hundred birds and mammals per week. October first, Mr. Miller is to sail from Georgetown for Barbados to join the Roosevelt expedition.

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**F**IELD work in Ecuador, under Mr. Richardson has proved successful during the past season and a shipment of 1400 birds and mammals has just been received from him. These specimens were collected in part on the coast from the northern extension of the arid coastal zone of Peru and give us definite information of where this arid strip merges into the humid coastal region of northeastern Ecuador and western Colombia.

Mr. Richardson also collected in the luxuriant forests of the subtropical zone at an altitude of 6000 feet, in the temperate zone about Quito and the base of Pinchincha, and in the paramo or alpine zone of Pinchincha and Chimborazo, working on the latter mountain up to an altitude of 16,000 feet. Here Mr. Richardson secured specimens and accessories for a habitat group to represent the bird life of the upper life-zone of this famous volcano.

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**F**ROM Peru, the Museum's available study material has received an exceptionally important addition in the collections made by Mr. R. H. Beck for Mr. F. F. Brewster and Dr. L. C. Sanford. A large shipment lately received from Mr. Beck is particularly rich in little-known marine forms collected well off the coast of Peru, and in a beautifully prepared series of water-fowl from Lake Junín, situated at an altitude of 13,000 feet in the Peruvian Andes, which includes the Andean flamingo and many other species not heretofore represented in the Museum.

# AMERICAN MUSEUM EXPEDITIONS FOR FOSSIL VERTEBRATES

By W. D. Matthew

THE American Museum expedition to Alberta in charge of Mr. Barnum Brown in search of Cretaceous dinosaurs, reports a very successful season. Nine dinosaur skulls and a correspondingly large series of skeletons or parts of skeletons have been secured. These all come from an older formation than those in which most of our Cretaceous dinosaurs have been obtained. Many, perhaps most of them, will be new to science, and we hope to recognize among them the ancestors of the horned dinosaur *Triceratops*, the armored *Ankylosaurus*, the duck-billed *Trachodon* and the carnivorous *Tyrannosaurus* which lived during the latest Cretaceous. Doubtless also we shall find among them others which left no descendants in the later fauna. The collection of over seventy boxes will soon be shipped to the Museum, and its preparation and study will be taken up during the winter. Mr. Brown regards this as the most successful season's work yet in his dinosaur campaign, bettering even last year's results.

Mr. Walter Granger, in charge of the American Museum expedition to the Eocene of New Mexico, has secured a fine collection of the very rare fossils from the Puerco formation of that region.

One of the most valuable portions of the Cope collection of fossil mammals purchased for the Museum by a number of the Trustees in 1894, was the collection from the Puerco formation. These were, and are, the most ancient mammals that we know much about; for the few remains of mammals that have been found in older formations are very fragmentary and exceedingly rare. With the Puerco fauna at the very beginning of the Age of Mammals commence the consecutive documentary records of the history of the evolution of the various kinds of higher quadrupeds. It is to palæontology what the Chaldæan records are to archæology.

Additions to the Cope collection of Puerco fossils were secured by the Museum expeditions of 1892 and 1896. Mr. Granger has now secured from the Lower or True Puerco horizon a collection equaling or exceeding in value all that the Museum possessed hitherto, and in addition a large series of specimens from the Torrejon or Upper Puerco horizon. Among the new specimens are a number of skulls and two or more skeletons. One specimen of *Ectoconus*, a primitive hoofed animal about as large as a bull terrier, from the Lower Puerco is fairly complete and is the most ancient mammal skeleton ever found. Other skulls and partial skeletons of primitive hoofed and clawed mammals are of scarcely less interest, and a number of specimens appear to belong to new genera and species. Altogether the collection is of remarkable scientific interest, and will provide material for a careful restudy of the Basal Eocene faunæ.

Among the most valuable prizes secured by last year's successful fossil expeditions were three skeletons of the gigantic and extraordinary "clawed ungulate" *Moropus*, a huge animal combining the proportions of a horse and a rhinoceros and with large curved claws on fore and hind feet. These skeletons were found by Mr. Albert Thomson in the great fossil quarry at Agate, Nebraska. This year Mr. Thomson continued work in the quarry hoping to find certain missing parts of the skeletons. Judging from his reports he has not only succeeded in finding most of the missing parts, but has discovered two or more additional skeletons equal to the best of those we had before. The Museum is now assured of the materials for a group of complete and finely preserved skeletons of this remarkable extinct animal.

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Fellow*, MR. PAUL GRISWOLD HOWES;

*Honorary Fellow*, DR. LEONARD C. SANFORD;

*Sustaining Member*, MRS. EMILY N. HUYCK;

*Annual Members*, MRS. JOSEPH J. CORN, MRS. WILLIAM C. DICKERMAN, MRS. J. R. SIMON, MISS ALICE A. DELAMAR, REV. CHARLES L. GOODELL, DR. LOUIS C. LEROY, DR. JAMES FRANKLIN NAGLE AND MESSRS. PAUL ARMSTRONG, EDWARD D. BETTENS, V. FORBIN, FERDINAND HANSEN, M. LEDERMAN, OSCAR LOWENSTEIN, B. FRANK MEBANE, WILLIAM STUBNER, FRANCIS J. SWAYZE, CHARLES WILSON TANTOR and A. WILLSTATTER.

DR. ROBERT BROOME, the chief authority upon South African palæontology, is visiting America for a year of scientific research especially upon the ancient vertebrates of the Permian period. He has honored the American Museum by accepting a temporary appointment upon its staff for this purpose, and has brought with him his splendid private collection of South African Permian reptiles, one of the best yet brought together. While slightly surpassed in size by that of the British Museum it rivals that famous collection from a morphological and exhibition point of view. The comparative study of this collection and of the large collections in this Museum from the Permian of Texas and elsewhere, will yield results of great scientific value.

PROF. H. E. CRAMPTON devoted the summer to the completion of the first volume of reports on the "Evolution and Natural History of the *Partula* of Polynesia." This volume deals with about 24,000 adult snails, representing the fauna of Tahiti and it presents the evidence which demonstrates recent evolutionary changes in the species and varieties of the island.

DR. FRANK E. LUTZ, accompanied by Mr. Charles W. Leng, is in Cuba on an entomological collecting trip. After a period of study in Havana where unusual facilities for work were accorded by Prof. Carlos de la Torre, the expedition established field headquarters in Pinar del Rio. Dr. Lutz reports results which are valuable not only in extending knowledge of the fauna of Cuba itself, but also in establishing an evolutionary connection of the insects of eastern Cuba with those of southern Florida. Field work will be continued into October.

DR. W. K. GREGORY, assistant curator in the department of vertebrate palæontology, attended the Birmingham meeting of the British Association for the Advancement of Science, having been invited to take part in the discussion on convergence in evolution. He also exhibited to the meeting some of the valuable specimens of early Tertiary lemuroids secured by our recent expeditions in the Eocene of Wyoming, with a discussion of their relationships to the various groups of Primates, living and extinct, and presented a paper by Dr. W. D. Matthew summarizing the important scientific results attained by the American Museum's expeditions in the Eocene formations during the last ten years, as conducted by Mr. Walter Granger.

REV. GILBERT L. WILSON of Minneapolis, a volunteer field-worker in anthropology, has just completed two months' study of the "zoöculture" of the Hidatsa-Mandan Indians in North Dakota. The term "zoöculture" is often used to designate all the relations between man and animals, especially such as are to any degree domesticated. Mr. Wilson reports the work unusually successful. His notes show that these people had worked out a detailed and definite body of knowledge for the breeding, training and use of dogs as traction animals. Later when horses were introduced among them, they worked out another system for that animal. The results of this study will be published by the American Museum.

MR. ALANSON SKINNER returned from a four months' collecting trip among the Indians of Manitoba and Wisconsin. While in Manitoba he made a detailed study of the so-called Plains-Ojibway, a group regarding themselves as independent of the Ojibway proper, and designating themselves as "Bungi," a name not heretofore appearing in ethnographical literature. Part of the Bungi reside on Turtle Mountain Reserve in North Dakota. The chief point of interest resulting from Mr. Skinner's observations is that these Ojibway present very clearly traits of culture pertaining both to the Central Algonkin tribes of the Eastern Woodlands and to the Plains Indians of the buffalo country to the west. The study of these transitional or mixed cultures is of great importance just now, because of the discussions between geographers and anthropologists as to the relation between geographical environment and culture. Also, such studies bear directly upon the theoretical problem as to whether a people gets its culture chiefly by borrowing it from others or by inventing it independently under the stimulus of similar conditions of life.

MESSRS. ROY W. MINER and H. MUELLER have recently returned from a collecting trip to Passamaquoddy Bay on the boundary line between Maine and New Brunswick. While in this region they obtained an extensive series of invertebrates for purposes of comparison with similar forms collected in recent years from more southern localities. Passamaquoddy Bay is an arm of the Bay of Fundy and is at the threshold of that region of great tides which at this point reach a height of twenty-eight feet above low water. Interesting observations were made in connection with the distinctness with which the faunal zones of life separate from each other in the "between-tides" area, as compared with the more condensed and overlapping condition of these zones in more southern waters, such as Casco Bay and the Woods Hole region where the rise of the tides is not more than ten and five feet respectively.

THE Charles S. Mason archæological collection from the vicinity of Jonesboro, Tennessee, has been presented to the American Museum by Mr. J. Pierpont Morgan. It contains several remarkable engraved shell gorgets and a number of unusual stone implements among which are two large exceptional celts. The entire collection came from one locality and thus constitutes an important addition to the Museum's series for the Eastern States.

# The American Museum Journal

VOLUME XIII

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Copyrighted photograph of a herd of impalla, Africa, by Carl E. Akeley

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MARY CYNTHIA DICKERSON, *Editor*

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**The Journal is sent free to all members of the Museum.**



*By courtesy of W. J. Sinclair*

#### RANCHO-LA-BREA

The old ranch-houses, with pool in foreground where asphalt was excavated for commercial purposes forty years ago. A bursting bubble-of gas in centre foreground



# The American Museum Journal

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## THE ASPHALT GROUP OF FOSSIL SKELETONS

THE TAR-PITS OF RANCHO-LA-BREA, CALIFORNIA

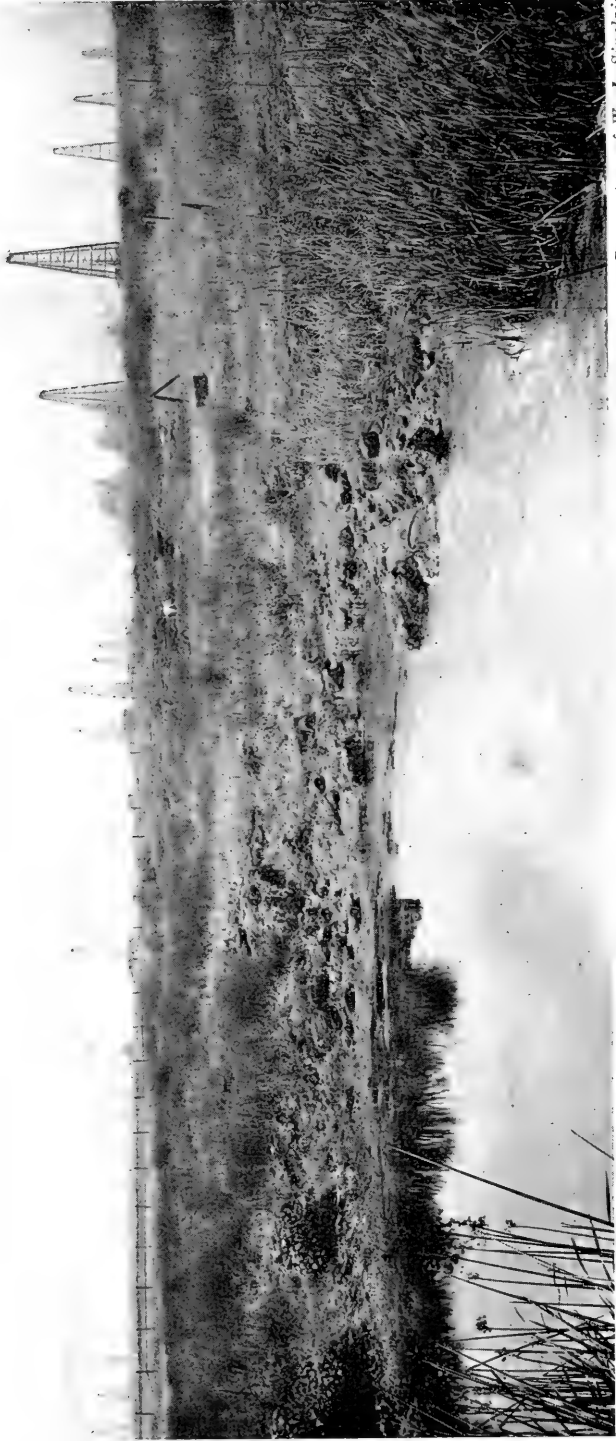
By W. D. Matthew

THE Museum has just completed and placed on exhibition a group to illustrate one of the most marvelous fossil deposits of the world. This is the famous asphalt formation of Rancho-la-Brea near Los Angeles, California.

The petroleum of southern California, as in most of the West, has an "asphalt base" — that is to say when it evaporates, the heavy oils left behind are asphaltum instead of paraffin. Wherever the petroleum oozes up from the earth in springs, this residuum of asphalt accumulates. The oil wells up continually from below and keeps it soft close around the spring, but elsewhere it is hardened into a solid mass mixed with earth or wind-blown dust. At the Rancho-la-Brea, in the centre of a broad open valley close to the city, is an extensive formation of this sort, made by oil springs which were probably much more active in former times than now. Here and there on the surface are little pools of semi-liquid asphalt, covered with a film of dust in dry weather, with water after a rain, yielding slowly beneath the weight and clutching with unbelievable tenacity whatever sinks beneath the surface. To the inexperienced eye the dust-covered surface looks like firm ground; except in the softer pools one can walk across it without any considerable yielding. But woe to the unfortunate animal that steps into one of the softer pools, or lingers on his way across a firmer surface to look about him or to drink of the water collected over the asphalt surface. His feet sink below the surface, the treacherous tar clutches them fast, and his most desperate struggles result only in sinking him deeper and deeper. Escape is impossible; he succumbs finally to exhaustion and little by little is sucked down and disappears.

Such has been the fate of many small animals in the last few years. Larger animals too, cattle, horses and dogs have been caught in the asphalt, some dragged out by the aid of ropes, while others not seen in time for rescue, have perished miserably. But the tar-pits although cruelly effective to the limit of their size, are not now large or numerous enough to constitute a serious danger.

At the time when these springs were active the asphalt pools were much



*By courtesy of W. J. Sinclair*

### THE FOSSIL BEDS AT RANCHO-LA-BREA

Excavation for fossils in the middle distance, and beyond, the oil-wells tapping the petroleum deeper down in the shales. The Santa Monica Mountains are in the background



*By courtesy of W. J. Sinclair*

Excavating for fossils at La Brea. Many white weathered fragments of bone are scattered over the surface. Oil-wells in the distance

larger and more numerous and formed a death-trap of terrible efficiency for the numerous animals that inhabited the valleys and plains of that region. This was in the Pleistocene Period, during the Glacial Epoch, when much of the northern part of the continent was buried under great fields of ice. Southern California, far below the southern limits of glaciation had probably a less arid climate than now, and a very large and varied animal population, mostly of extinct species and some of them very widely different from the living animals of the region.

Excavations for road asphalt in this formation were commenced in 1874 by Major Hancock, the owner of the ranch. The material was melted down to free it from impurities and shipped in barrels to San Francisco and elsewhere. The work was not continued as the cost of purifying the product was too high for it to find a profitable market at that time. It served to call attention to the fact that the asphalt contained numerous bones or fragments of bones, and when examined by scientists it appeared that these were not modern bones but belonged to extinct animals. Prospecting for fossils soon showed that around the little oil springs or where springs had formerly come up, there were pipes or chimneys of soft asphalt, which were veritable ossuaries, packed full of the bones of these extinct animals, mostly in marvelous preservation. The excavations of the local scientific societies and the more extensive work carried on by the University of California have yielded many hundreds of skulls and tens of thousands of skeleton bones, of a great variety of animals large and small. The bones are impregnated with asphalt, otherwise little altered; but flesh and hide, horns and hoofs



THE ASPHALT GROUP IN THE AMERICAN MUSEUM OF NATURAL HISTORY

The new group [fourth floor, east wing] shows the sabre-tooth tiger to the left, extinct wolf to the right and ground sloths in the foreground

have completely disappeared, dissolved out by the petroleum and long since converted into bitumen, water and gases. The skeletons are never articulated; the bones are all jumbled up together in a crowded mass by the slow internal movements of the half-liquid asphalt in which they were entombed thousands of years ago.

It is safe to say that the La Brea asphalt is the richest repository of fossils ever discovered, if we consider the variety of extinct animals found in it, the perfect preservation of their remains and the ease with which they can be extracted and cleaned up. It is practically unique: asphalt deposits of this type are common enough wherever an asphalt base petroleum comes or has formerly come to the surface, but bones have rarely been found in them and never upon any such scale as this.

How many kinds of animals are represented in the collection is not yet known. Over fifty species of birds have been identified, and there are probably at least as many kinds of mammals. The most remarkable fact is the great abundance of carnivorous quadrupeds and birds of prey. Wolves, lions and sabre-tooth tigers, eagles and vultures are the most common of all the remains found; next to them stand the larger herbivora, bison, horses, ground sloths and larger ruminants and wading birds; while remains of smaller quadrupeds and perching or ground birds are comparatively rare. This is a fact of grim significance, for it indicates that the larger quadrupeds, venturing out upon the seemingly solid surface and caught in the asphalt, served as a bait for animals and birds of prey, luring them from all the country round about and enticing them within the treacherous clutch of the trap. These in their turn, falling victims, served to attract others of their kind. And so the "death-trap of the ages," as a poetically-minded Californian writer called it, self-baiting, automatically disposing of its prey, has collected and preserved to our time a truly wonderful series of the predatory animals and birds. The smaller animals, light and active and seldom venturing beyond the brink of the pool, were not often caught.

In February of this year (1913) the writer paid a visit to this locality at a time when excavations were in progress for the University of California. The object was to study the conditions at the "tar-pits" as a guide to the construction of a characteristic group exhibit for the American Museum, and to secure by exchange with the Californian museums a full representation of the fossil fauna. Every possible courtesy was received from the several institutions mentioned in getting together the necessary data and materials and especially from Professor J. C. Merriam of the University of California. The group as it stands is based chiefly upon the studies and conclusions of Professor Merriam, so far as we have succeeded in understanding and expressing them correctly. In effect, it is meant to convey a picture of the operation of this Pleistocene death-trap. No attempt is made to cover the skeletons with flesh and hide — this the visitor may imagine for



Restoration of the sabre-tooth tiger (*Smilodon californicus*) by Erwin Christman. A ground sloth (*Mylodon*) is nearly submerged in the asphalt pool

himself; and add if he pleases the scanty vegetation of a dry country around the margins of the asphalt spring.

Two ground sloths (*Mylodon*), great heavy, thick-haired, clumsy, clawed beasts distantly related to the living tree sloths, but as big as a grizzly bear, have been caught in the asphalt. In spite of their struggles indicated in the disturbed and broken surface of the pool, they have sunk down until only the head and fore limb of one, and the head of the other, appear above the black asphalt.

A sabre-tooth tiger (*Smilodon*) one of the most powerful and dangerous of the extinct beasts of prey has been attracted by the struggles of the hapless ground sloths, and hastened to the spot to kill and devour them. But in his eagerness, he too has been trapped and is now vainly trying to extricate his feet, already beginning to sink below the surface.

Meanwhile, a fourth animal, the great extinct wolf (*Canis dirus*) has come up. More wary, or as yet more fortunate, he has come over the solid hardened asphalt, and avoided the treacherous surface of the pool. He sees his ancient and dreaded enemy the sabre-tooth and the powerful and bulky ground sloths in difficulties where neither teeth nor claws will avail against his attack. He dare not yet spring in to attack them but leaps about on the margin of the pool in high excitement, barking out his real opinions in regard to sabre-tooth tigers, which under ordinary circumstances he would reserve to a safer margin of distance. The *Smilodon*, distracted for a moment from his desperate attempts to free his feet from the entangling mass,



Restoration of the extinct wolf (*Canis dirus*) by Erwin Christman. Asphalt pool in foreground with a bursting gas bubble

answers with a savage snarl, which we may interpret as a wish, soon to be fulfilled, that the wolf would bear him company in his troubles.

Such is the little drama that our group sets forth. A realistic story it is — a characteristic incident which must have happened, pretty much as we have told it, again and again during the time — many thousands of years ago — when these tar-springs were active.

That thousands upon thousands of animals, great and small, perished by this frightful death in the tar-pits of La Brea, is witnessed by their skeletons; that so large a proportion of them were savage beasts of prey may be to some a consolation, although nature accords no higher place or superior morality to the vegetarian over the carnivore. At all events it does not appear that the trap was seen by human eyes in the days of its vigor. No remains of man, tools, weapons, or other indications of his presence have been found associated with the extinct animals. There are various reasons for the belief that man is rather a recent arrival in the New World, and had not reached the Pacific Coast when these animals were perishing in such numbers in the tar-pits. Still he might have witnessed it.

The fossil skeletons used in preparing this group were presented in exchange by the University of California, through Professor J. C. Merriam, to whom we are also indebted for most of the evidence upon which their grouping is based, and many helpful suggestions and criticisms.



GUN-BEARERS OF THE EXPEDITION

Wild men of the Cheringani Hills hunted with members of the expedition, giving loyal coöperation throughout the work



# TRACKERS OF THE CHERINGANI HILLS

HUNTING THE RHINOCEROS<sup>1</sup> IN BRITISH EAST AFRICA FOR  
CONSTRUCTION IN THE AMERICAN MUSEUM OF A GROUP  
OF THIS FAST-DISAPPEARING SPECIES

By W. S. Rainsford

Photographs by Jenness Richardson

“IF I could only meet that great bull elephant, the bull of my dreams, the mighty tusker who will some day be seen by some lucky mortal, hide he never so cunningly, I think I could scarcely shoot him until I had hugged him for joy.” This remark shows the enthusiasm and keen determination of one of our persistent hunters and naturalists. Little know the people as they gaze in some natural history museum at some fine beast or bird, labeled with a half understood name, coming from a half unknown land — little do these people know at what cost paid in adventurous human life the stuffed specimen they admire is presented to them. Hunters, explorers, collectors, soldiers, civil servants, missionaries — the African sphinx follows her Grecian cousin’s example and may strangle them if they persist in the attempt to unravel her riddles.

The ideal African hunter or expedition leader should have the endurance of a man under forty years old, should have a copper-lined stomach and be immune to tick, tsetse and mosquito. Climatic conditions should mean nothing to him. He should prefer the borderland of a swamp or even its pestiferous depths to the breezy upland if only he can win the one thing he is after.

British East Africa has had many secrets wrested from her in the past

<sup>1</sup> Editorial Note:—The American Museum does not possess a group of the common black rhinoceros of Africa. In face of the fact that this rhino like the buffalo and zebra is positively doomed to extermination in the near future because an annoyance to settlers in the country, it seemed advisable to take steps to get material for such a group while rhinos of maximum size are still to be found.

As to big-game conditions in British East Africa, unusual interest attaches to the following quoted from a recent publication of the New York Zoölogical Society, *Our Vanished Wild Life*, by William T. Hornaday:

“As matters stand to-day in British East Africa, the big game of the country outside the three preserves is absolutely certain to disappear in about one-fourth the time that it took South Africa to accomplish the same result. The reasons are obvious: superior accessibility, more deadly rifles, expert professional guides and a widespread craze for killing big game.

“... With care and economy, British East Africa should furnish good hunting for two centuries... Mr. Arthur Jordan has seen much of the big game of British East Africa, and its killing. Him I asked to tell me how long, in his opinion, the big game of that territory will last outside of the game preserves as it is now being killed. He said, ‘Oh, it will last a long time. I think it will last fifteen years.’

“Fifteen years! And this for the richest big-game fauna of any one spot in the whole world, which Nature has been several million years in developing and placing there!... ”

“The bag limit... is ruinously extravagant... It is awful to think that for a petty sum [\$250.00] any man may buy the right to kill 300 head of hoofed and horned animals of 44 species, not counting the carnivorous animals that also may be killed. That bag limit should immediately be reduced 75 per cent.”

fifty years. To-day the country with its railroad line and government road and its large population of colonists is no longer the place that it was for finding large game. The Third African expedition of the American Museum had received permission to kill four rhinos and three buffalo in British East Africa — in the wilderness, not in one of the game preserves — but felt considerable indecision as to the right locality for the work. Even



Some of the wild men of the Cheringani Dorobo who worked for the expedition. None of these natives had met a white man before the leader of the expedition went among them in 1908 when on a previous visit to Africa

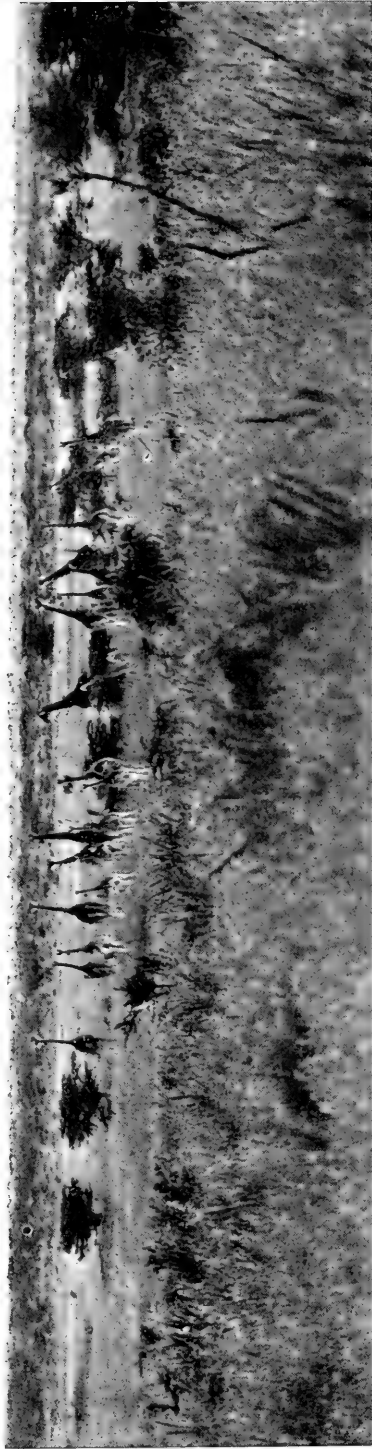
three or four years ago good specimens of African mammals could be obtained along the Uganda railroad. They have now disappeared not only from there but also from many of the localities farther afield. Such is the case in regard to rhinos in the region south of the Uganda railroad and west of the Guaso Nyiro River near the German borderland. Rhinos are found



To keep the expedition supplied with food a small herd of donkeys traveled between depots in the hills and the lower country. A donkey load is 120 pounds



An African leopard. — "As matters stand to-day in British East Africa, the big game of the country outside the three preserves is absolutely certain to disappear in about one-fourth the time that it took South Africa to accomplish the same result."



A herd of giraffe. "The bag limit... is ruinously extravagant... It is awful to think that for a petty sum [\$250] any man may buy the right to kill 300 head of hoofed and horned animals of 44 species, not counting the carnivorous animals that also may be killed. That bag limit should immediately be reduced 75 per cent."



Very large lion shot by Dr. Reainsford

only of small size in the region of the Tana, also in the Serengeti Plains between Voi and Kilimanjaro, as also in the country south and east of Lake Rudolf and in that about Mt. Kenia.

After much study of the question, the Nzoia Plateau especially the Cheringani Hills at its eastern part was chosen as the hunting ground, a small area, about one hundred miles by seventy in extent and some one hundred and fifty miles from the railroad. This choice of territory fortunately gave us as companions and guides, the warriors of a little tribe there, the Cheringani Dorobo.

In 1908 I had made friends with this small tribe of poison-hunters. Secure in the fastnesses of their dense woodlands, they had controlled the land for ages. Fear of the deadly poison of their arrows and the cunning secrecy of their deep-spiked game-pits had kept off the hunting safari; while the uncertain attitude toward the white men, maintained until quite lately by their neighbors, the Elgeyo tribe on the south and the Maraquette on the north, had closed the door effectually in that whole countryside to every expedition other than a military one. These very shy natives now agreed to come down from their mountain villages and serve the new expedition. Half a dozen real trackers were soon picked out among them. Three abreast where the ground was open they would follow the spoor at a fast walk, and interpreting the rhino's brainless wanderings — signs which even to the safari leader's experienced eyes were invisible — would gain knowledge as to where the game was going and where it would rest.

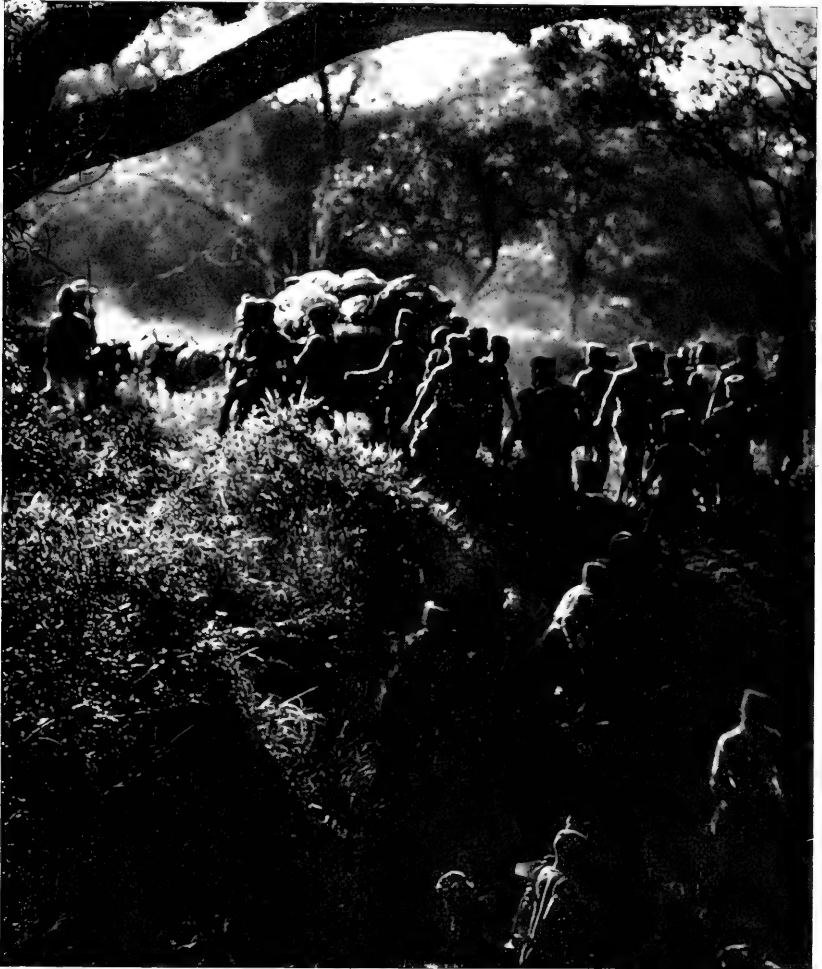
The forest was so dense at times that we used some forty or fifty natives as signallers and beaters. The method took time to organize but worked well. The Cheringani were cautious when following rhino. It is very easy to shoot this animal in the open. In dense cover it is another matter, and beaters and trackers I must confess, spent much time safely if not usefully up trees. When on the trail of buffalo, which also are easily shot in open country, only a few of the bravest would go into the black hollows that hid the beasts, and once a buffalo was wounded I had to go in with them or no one would go. Good fortune attended us however and in all the history of the expedition no one of the hundred and fifty men was seriously injured. The risk of hunting buffalo in wooded country is sadly proved, if proof were necessary, by the later fate of the very best of the natives I employed. He was a brave boy and wonderfully good as a tracker. After



A well built Dorobo

our expedition left the country another party hearing of its success secured the guidance of these Cheringani. This young native acted as gun-bearer and was killed by one of the first buffalo shot at.

When the tracking led to success and an animal was killed, the expedition



Hard work with our wagon. Deep ravines and swamp-edged streams made necessary considerable bridging and road-making

made camp and remained on the spot until the heavy skin was thoroughly cared for. Mr. Jenness Richardson, the taxidermist of the expedition, was indefatigable and also trained many of the natives — some to unusual skill — in the work of preparing skins and caring for the skeletons.

One of the great difficulties of the expedition was transportation of its

large and heavy supplies through the country of the Cheringani. This country has forests unusual for East Africa. The altitude ranges from a little over 4000 feet above sea level in some of the lower parts to 10,500 feet where dense woodlands cover the summits of the hills. Impassible ravines and deep swamp-edged narrow streams were met with everywhere



One-year-old lion

and made necessary considerable digging and rough bridging and road-making.

Our usual method of transportation was by ox team. Sometimes as many as thirty-two oxen were put in the iron chain that hauled our wagon. Almost two tons of fine salt were necessary for the preparation of the skins. A large tent in which many men could work on the skins had to be carried; also a great weight of *posho*, the natives' food of ground meal. Our consumption of this was about two hundred pounds each day. *Posho*, as all well know who have left civilization far behind in African lands, is the cause of the chief difficulty of all explorers. It may be impossible to procure, once off the main lines of travel, and must be had not at intervals but always. The breaking up and ruin of expeditions is often due to



Chita cubs. The chita or hunting leopard differs from all others of the cat family in the lack of retractile claws. It hunts antelope, reedbeek and kudu, stalking the prey with stealth and cunning preliminary to a lightning-like rush. For a considerable distance it can outstrip the swiftest antelope



The expedition halted under a thorn tree ninety yards in diameter

the failure to provide *posho*. In British East Africa government land regulations require that each porter engaged receive regularly his pound and a half of ground meal a day. Failing that, he has a grievance against his employer that frees him from any obligation to serve. Now one hundred men eat 150 pounds a day, i.e., 4500 pounds a month, or 27,000 pounds in six months. In our case we had been obliged to carry all this over one hundred and fifty miles on men's heads or by donkeys before it was available.

To keep the expedition in food I hired a small herd of donkeys (a donkey-load is 120 pounds) and kept it constantly traveling between depots in the



We were obliged to transport the supplies and equipment of the expedition one hundred and fifty miles from the railroad to the Nzoia Plateau



hills and the lower country under the guidance of capable and trustworthy natives. This plan as a rule worked well, but often the camp was denuded of all porters for days together, in order to keep up the ration supply.

How the Cheringani have preserved their tribal life (they only number a few hundreds) is a mystery. Perhaps their preservation is chiefly owing to two things: their poverty and their poison. They are not, or have not been, owners of herds, and not to own herds in Africa is at least to avoid



Bull buffalo head. The expedition had been given government permission to shoot three buffalo for a group in the Museum

having to pay heavy insurance risks. Four-fifths of the fighting done between tribe and tribe has been about cattle. Until the English came, the very existence of the cattle-owning people had been altogether dependent on its organization for war as among the Masai, or on its possession of a country in which the herds could be hidden or defended from the powerful cattle-raider. The Masai for instance, the great cattle-owning tribe, have for the first article of the tribal creed, "In the beginning God gave all cattle to



These poison-hunters had unusual ability in interpreting and following the rhino's wanderings.

the Masai." Hence the natural and inevitable corollary, "The Masai have a right to any man's cattle."

In their poison the Cheringani have a very terrible weapon and they are extraordinary in the suddenness of their movements. The making of the poison is a guarded secret. After some months they were willing to show me the tree it was brewed from, but as to the details of its production they were persistently silent. As in the poison-making of other lands, certain complicated rules must be obeyed and customs followed. The poison-maker must leave his hut and his women-folk for weeks or longer. He must live quite alone and work alone. So much I learned. The poison loses strength by keeping, so much they admit. I am inclined to think this loss is rapid.

The Cheringani trade the poison made by them to the surrounding tribes. The Nandi, their neighbors on the other side of the Nzoia



Black rhinoceros head. The main aim of the expedition was to procure material for a black rhinoceros group in the American Museum

Plateau, used it in their war with the Government a few years ago and several soldiers in the King's African Rifles were struck by poisoned arrows. When men were wounded, the doctors told me, the poison seemed to affect the heart but yielded to arsenic and the wounded did not die. From what I have seen, one struck by poisoned arrows such as the Cheringani make—if the poison be freshly brewed—cannot fail to die almost instantly.

The unhunted region of the Cheringani range was chosen for the work of the expedition at the advice of Mr. Woosman, Chief Game Ranger of British East Africa, whose great ability and experience gives his judgment value. The success of the expedition must be largely credited to the work of the trackers

chosen from the wildmen of the Cheringani Dorobo. They had had little experience hunting with white men previously but nevertheless gave us their steady coöperation. I have had in past years considerable experience of trackers and tracking but never before in Africa have I seen work done comparable with that of the trackers of the Cheringani.



Capturing a viverrine cat alive



Silver-haired pig of the African forest. This is a species rarely captured and more rarely photographed



Photo by E. O. Hovey, 1911

### VIEW IN THE SECOND FOREST

The so-called "fossil forest" of Arizona is not a forest at all nor is there any evidence that the trees grew on the spot where they are now found. They were probably drifted by stream action into the present locality where they became buried under accumulations of sand. The logs belong to a cone-bearing tree (*Araucarioxylon arizonicum*) which no longer grows in the northern hemisphere. On June 8, 1906, by proclamation of President Roosevelt, the region of the fossil forest was set aside permanently as a public park

# THE "FOSSIL FOREST" OF ARIZONA

By George P. Merrill

Head Curator of Geology, United States National Museum

THE so-called "fossil forest"<sup>1</sup> of Arizona lies some six miles south of Adamana, a station on the Santa Fé Railroad, in Apache County. The expression "so-called" is used for the reason that it is not a forest at all, nor does it bear any resemblance to one, being rather a collection of silicified logs. Could one imagine a collection of saw logs ponded back in a boom and waiting their turn at the mill, and that further this collection had become water-logged, sunken and buried by sediments, he would gain a very fair idea of the conditions which apparently at one time prevailed during the history of the region. There is nothing to indicate that the trees even grew near the locality where the logs are now found. It is apparent rather that they grew at some distant point and were drifted by stream action into eddies after having been reduced to mere trunks or logs through the loss of their leaves and smaller limbs. Here, in various stages of decay, they sank and became buried by the accumulations of sand and gravel and subsequently silicified. Nor are the logs now, with few exceptions, even in the position of their original entombment. The beds in which they once lay have been cut through by erosion and the logs settled, or rolled down to a lower level. In this process they became more broken and under alternations of blistering heat and freezing cold have been splintered and chipped, oxidized and polished, until the country for an area of many square miles is covered with a bewildering array of broken trunks and fragments of agate and jasper, varying from nearly colorless through yellow and red to the most brilliant carnelian. The few logs which remain in the position of their original entombment are widely scattered and the one best known to the tourist is that forming the so-called "natural bridge," where an enormous log has been undermined by the action of temporary streams and remains supported at both ends spanning a chasm of nearly fifty feet in width and twenty or more feet in depth.

It is apparent that there were at least four eddies in which the logs accumulated in the area now comprised within the reservation known as the Petrified Forest National Monument of Arizona. The first lies some six

<sup>1</sup> Note.—The area of the Petrified Forest is well represented in a map issued by the United States Geological Survey. The map published in December, 1912, is the result of a survey made two years previously and shows the location and topography of the six separate forests. The trees are perhaps millions of years old and consist to-day of many-colored agate, an exceedingly hard and tough stone. Visitors to the American Museum can see many interesting specimens from the Petrified Forest. In the gem room are several particularly fine polished slabs of agatized wood from near Adamana and in the mineral collection is a two-foot section of agatized log from the same region. In the corridor on the ground floor leading to the building-stone collection is a considerable series of specimens illustrating the several phases of growth and fossilization collected by Dr. E. O. Hovey under special permit from the Department of the Interior.



*Photo by E. O. Hovey, 1911*

General view in the third forest.—The fossil forest of Arizona shows a natural division into separate so-called "forests." The photograph presents a general view in the third forest quite typical of the whole region



*Photo by E. O. Hovey, 1911*

In the first forest.—The silicified logs have rolled down from the upper sandstone layer under the influence of wind and water erosion of the rock containing them

miles south of Adamana. This area includes the natural bridge already referred to, and a considerable collection of broken trunks which, while interesting and instructive, cannot compare in point of beauty or size with the second, third and Rainbow forests further to the south and southwest. Both the second and third have suffered less through erosion than the first and the logs are less broken, and it is here that one gains the best impression of the enormous dimensions of these silicified monsters. Trunks occur of all sizes up to five feet or more in diameter and sixty or eighty or even a



*Photo by E. O. Hovey, 1911*

Spectacular effect of erosion in the first forest.—The lower portion shows clays of many colors and on the ground at the base are broken logs of petrified wood. An osprey has built its nest on the pinnacle of sandstone

hundred feet in length. Of all the deposits, that known as the Rainbow Forest is the most fascinating on account of the richness of the colors, although from a geological standpoint it is a wreck. Few if any of the trees occupy their original position of entombment, but all are tumbled about in a confused, chaotic manner, in the numerous gulches and ravines which result from the spasmodic periods of erosion characteristic of arid regions.

It is to be regretted that the average tourist, who devotes season after season to European travel, does not feel that he can devote more than a portion of a single day to the investigation of these wonderful deposits of

his own country. This necessarily limits him to the first, or possibly to the first and second forests. One should devote at least two days to them, passing the first day through the first and second forests and arriving at the third in season to camp at the one water hole within the entire area. The forenoon of the second day can well be given up to exploring the third and Rainbow forests, and the afternoon to the return to Adamana. Such a trip involves no hardship. Camping at the altitude of 5000 feet in the dry atmosphere is simply exhilarating and the small supply of food and water needed can readily be carried with the outfit which is furnished by the superintendent at Adamana.

The geology of this area was first worked out in detail by the late Professor Lester F. Ward, then connected with the United States Geological Survey. He described the region as consisting of the ruins of a former plain having an altitude above sea level of something like 5700 feet. This has now undergone erosion to a maximum depth of nearly 700 feet and is cut into innumerable ridges, buttes and small mesas with valleys, gorges and gulches between. The rock formations consist of nearly horizontal, alternating beds of purple, white and bluish marls, sandstones and shales, giving a lively and pleasing effect such as is characteristic of so many of the landscapes of the state. The beds in which the logs were entombed were deposited at the bottom of a Mesozoic sea, where they remained until Tertiary times when the entire country was raised from five to six thousand feet above sea level. The logs throughout the area belong to a cone-bearing tree, of a single species, described by Dr. F. H. Knowlton of the United States Geological Survey under the name of *Araucarioxylon arizonicum*, a tree no longer found in the northern hemisphere, its nearest representative being a small cultivated form known as the Norfolk Island pine.

As to how the trunks became petrified or silicified we are still somewhat in the dark. Silica is ordinarily one of the most insoluble substances, but nevertheless readily soluble in an alkaline solution — that is, one containing soda or potash. It is probable that the solutions permeating through these beds were of this nature and as the logs gradually decayed their organic matter was replaced, molecule by molecule, by silica. The wood is therefore not "turned to stone," but has simply been replaced by mineral matter, mainly silica. The brilliant red and other colors are due to the small amounts of iron and manganese deposited together with the silica, and super-oxidation as the trunks are exposed to the air. The more brilliant colors are therefore to be found in the small chips lying on or near the surface.

Prior to 1906 these forests were on government and railroad lands and subject to the vandalism of curiosity seekers and those commercially inclined. At one time a considerable industry was carried on in cut and polished sections of the sounder and more highly colored varieties, and





*Photo by E. O. Hovey, 1911*

Natural bridge, seen from above.—The log best known to the tourist is the one in the first forest, forming the so-called "natural bridge". This log remains in the position of its original entombment but has been undermined by water until it is supported at the two ends only over a chasm fifty feet wide and twenty feet deep



*Photo by E. O. Hovey, 1911*

View of natural bridge from below.—The bridge has recently been reënforced by artificial stone piers



*Photo by E. O. Hovey, 1911*

Scene about eight miles east of Adamana.— The ground is covered with chips broken off from the logs by Indians in making arrow points. Hammers of agatized wood were used in chipping the logs



*Photo by E. O. Hovey, 1911*

Only a few of the fossil trees remain intact.— The greater number cover the ground in a bewildering array of broken trunks and fragments

visitors to the numerous expositions of late years will probably remember the striking examples shown by a firm with headquarters at Sioux Falls, South Dakota. Fortunately the matter attracted the attention of public-spirited men and in 1895 the territorial legislature of Arizona memorialized Congress, calling attention to the region and asking that the area be set aside as a national park. This was done after investigation by the Land Office and the Geological Survey, and a proclamation by President Roosevelt issued June 8, 1906, set it aside permanently as a public wonderland and playground. Subsequently in 1911, the area was resurveyed and reduced in size and a new proclamation issued by President Taft.

In order to preserve the forest indefinitely visitors are prohibited from breaking or injuring the logs in any way, although permitted to carry away a few pounds of chips picked up from areas set aside for the purpose.

# MUSEUM COÖPERATION IN THE TEACHING OF SCHOOL HYGIENE AND SANITATION

By C.-E. A. Winslow

Address before the Fourth International Congress of School Hygiene at Buffalo, August, 1913

ALL of us in attendance at this Congress are probably convinced that the science of life and health is the one thing which should be taught in the public schools whatever else may be neglected. I know however that there are many who are quite as insistent on the importance of grammar or arithmetic or history, drawing or French, carpentry or cooking or basket work; and the result is that many school boards shut their ears to us all alike. Nevertheless, I am ready to brave the obvious reproach of being merely another faddist by urging that the principles of biology and public health should occupy a truly central place in the curriculum of elementary and secondary schools, and I believe that the things for which such a Congress as this stands are not the idiosyncrasy of a few enthusiasts but, if properly presented, have behind them an overwhelming force of public opinion.

It is an obvious truism that education is meant to prepare for living; and it seems clear that the most general and fundamental phases of the art of life should receive proportionate representation in the preparatory process. The average man uses his history once a day perhaps, his arithmetic somewhat oftener. Even his English grammar is on trial during a part of his working hours only, and his whole mental equipment is put by for a third of the twenty-four. He is *living* all the time however, and is either well or ill, happy or miserable, efficient or useless, largely as a result of the conduct and management of the delicate physical machine which is in his charge. He may be innocent of historic fact, of the multiplication table and of syntax, and yet be a useful and contented citizen. He cannot be either long without observing the laws of hygiene and sanitation. I fancy that any one with a child of his own will have no doubt that knowledge of what to eat and what not to eat and why, of the meaning and importance of fresh air, of the claims of exercise and rest, of the essential routine of body cleanliness, of how germ diseases spread and how they may be controlled, of the methods of rendering water and milk safe and the reasons therefor, of the dangers of insect-borne disease and of the essentials of public sanitation — are of even greater moment than those things which prepare for the intellectual and social life.

There might be two reasons for the comparative neglect of this transcendently important subject, a neglect which still persists in spite of the encouraging development of recent years. It might be claimed that although it is desirable to keep healthy we have no body of knowledge which will enable us to do so. This was undoubtedly true in the past and is historically the reason why biology and public health have occupied so obscure a place in the curriculum. It is not true any longer. We have to-day a large number of principles and applications which enable us to keep the bodily machine in the best working order and to guard it against the insidious attacks of communicable disease. Or on the other hand, it might be held that, although essential and available, knowledge of how to live a healthy life could better be obtained in the home than in the school. It is obvious that this claim is wholly untenable, not only for the teeming populations of the tenements who come often from other countries with sanitary conditions of a lower grade than ours, but even for many of the most enlightened households, since in a subject growing so rapidly as

sanitary science, knowledge ten or twenty years old is almost as good as none. There is no other single thing which the child needs so much to know as how to keep well. The knowledge which is essential is available; and it can be transmitted only by the school.

The high schools in New York City have seen this need and this opportunity and have done much toward meeting it. In almost all of them the practical aspects of biology occupy an important place and in many of them, like the DeWitt Clinton High School and the Morris High School, the broader aspects of sanitation are well taught under the head of civic biology, while the larger girls' schools, the Washington Irving and Wadleigh High School, have developed exceedingly promising courses in home sanitation as well.

In this work there seemed to be an opportunity for coöperation between the newly organized department of public health of the American Museum of Natural History and the public schools of New York; and it is of this coöperation that I wish to speak very briefly to-day.

The existence of a department of public health in a natural history museum deserves a word of explanation by the way, for it is, so far as I am aware, a unique circumstance. The American Museum is, I think, the first institution of its kind to grasp the opportunity of attacking the educational problem of public health by the use of museum methods. This development is really however, a natural, almost an inevitable one. Man is an animal and public health is one of the most important phases of his natural history. He is knit up with other animals and plants in a complex chain of interrelationships, beneficent and malign. The plants and animals which serve him for food, the microbes which cause some of his deadliest diseases, the insects and other animals which serve as intermediate hosts, and those which prey upon them in turn, all affect him and act as determining factors in the fate of nations and the progress of civilization. They are as much parts of natural history, broadly interpreted, as habitat groups of birds or preparations illustrating the relations of insects to the plants or other insects upon which they feed. To show these things in graphic form by actual specimens, by models and by diagrams, is the task of a department of health in a natural history museum and it is a task which no other agency is so well fitted to accomplish.

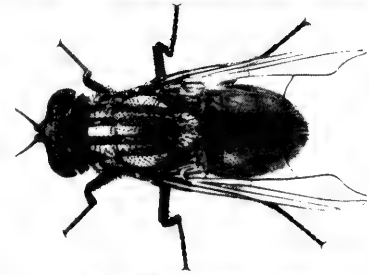
In the hall of public health of the American Museum we have now, after three years' work, installed three fairly complete series of exhibits dealing with water supply and public health, with the disposal of city wastes and with bacteria, while a fourth series, illustrating the relation of insects to disease is well under way. The water supply series begins with the rainfall and shows by models, diagrams and relief maps how the amount and frequency of rain varies over the continental United States. The physical characters of waters are illustrated by samples of a highly colored water from the Dismal Swamp, of a hard well water from Iowa, of a turbid water from the Ohio River and the like. Glass models show the principal micro-organisms, the algæ, diatoms and protozoa, which cause tastes and odors in water-supplies. The danger from polluted water is illustrated by relief maps of famous water-borne epidemics at Lausen, Switzerland, and in the Merrimac Valley. Methods of purifying water, by storage, filtration and disinfection are made clear by models, and finally the results of water purification are set forth in a series of diagrams.

The models dealing with the disposal of city wastes include local illustrations of pollution of shellfish, floating baths and other dangers of the harbor waters of New York and a detailed presentation of the methods of treating city sewage by screening, sedimentation, filtration and disinfection.

The bacterial exhibit consists of a series of glass models of the principal disease bacteria, 25,000 times natural size and of photomicrographs illustrating their relative



**BACTERIA AND DISEASE.**—Most of the bacteria are harmless and some are useful to man. A few of them however are adapted to life in the human body and when they grow in the body the chemical changes they produce poison the body and cause disease. One of these disease bacteria is the germ of typhoid fever which is often spread to large numbers of people in polluted water and milk. The photograph shows how such an epidemic occurred in the Merrimac River valley in 1890. From August to October there were 8 cases of typhoid fever in the little village of North Chelmsford [at extreme left on map] . . . 503 cases of typhoid fever followed between October and January in Lowell [4 miles below on the Merrimac River] . . . and 223 cases followed between November and February in Lawrence [9 miles farther down the river]. *Quoted from American Museum School Chart*



**THE HOUSE-FLY.**—At the left, fly larvæ and pupæ in old papers; at the right, fly larvæ in stable manure. The house-fly (better called the filth-fly) does not bite and is not the sole cause of any disease as mosquitoes are the sole cause of malaria and yellow fever. It often carries filth to food however, on its feet or body, and in this way may spread diseases like typhoid fever. The fly lays its eggs in horse manure or some other decaying substance and from the eggs white worm-like larvæ hatch out. These larvæ form brown oval pupæ which hatch out the adult at a period of about ten or twelve days from the time the eggs were laid. *Quoted from American Museum School Chart*

size and shape, and of actual colonies of many types of useful and harmful bacteria showing how mass cultures of the microbes look to the naked eye.

The relation of insects to disease is a particularly fruitful field for museum work and is the one upon which we are chiefly engaged at the present time. The American Museum already has in its department of invertebrate zoölogy wonderful enlarged models of mosquitoes and the department of public health has just installed a model of the house-fly, enlarged forty diameters, which took its skilled artist-modeler, Mr. Ignaz Matausch, nearly a year to complete. A wide series of facts bearing on the life history of the fly are illustrated as well as the relation of the fly to disease, the practical methods for its control and the results achieved thereby. A similar, but more enlarged model of the flea (carrier of bubonic plague) is now under preparation and we have already installed models, some small and some life size, dealing with the rats which harbor the plague microbe and from which the flea carries it to man.



HOW DISEASE IS PREVENTED. . . Pasteurizing means heating the milk to 150°-160° F. for 20 minutes. This does not injure the milk. . . but kills all the germs of disease. . . Impure water can be purified. . . by boiling it. *Quoted from American Museum School Chart*

on any subject within its field for any teacher who may ask it and for any number of pupils, from a score to a thousand. Or, if the teacher prefers to give the lecture himself, we provide hall, lantern slides and operator. The larger high schools send their classes twice a year near the end of each term for a talk on water or milk, or insect-borne disease, city-cleaning or some other topic which fits into the course of study at the time.

New York is a large city however, and the children from many of the schools can come to the Museum only a few times a year. It was necessary to get our illustrative material into the schools themselves if it was really to be effective. For some time the American Museum has taken an active part in the nature study work of the public schools by circulating loan collections of birds, insects, mollusks, sponges, corals, woods, minerals and the like. Over 500 of these cabinets circulated in 491 schools in 1912 reaching 1,275,890 children. Of this work President Osborn of the Museum has said, "Step by step a great system of coöperation has been built up between the regular course work in the schools and the visual instruction in the Museum,

the opportunity for future development here, and in connection with the mosquitoes of malaria and yellow fever, and a score of other disease-carriers, is a tempting one which we hope to develop in the next few years.

This hall is our first opportunity to serve the public schools in their work of health education. They bring their classes to the Museum in one of the periods allotted to civic biology and in an hour with these models and diagrams learn more than they could get from books and lectures in a month.

In addition to the hall, which is open to all the visitors to the Museum (numbering eight hundred thousand a year), we arrange special lectures to the school children on the occasion of their visits. It is the policy of the Museum to provide lectures (generally illustrated)

until the city of New York now affords the most brilliant example in the world of extension to the school system of all the resources of a great museum."

Here then was our example; and at the instance of some of the high school teachers most active in civic biology we have attempted to apply the same plan to public health extension work.

Our first attempt was in the form of an album of large photographs dealing with the spread and prevention of communicable disease. These were mounted on cardboard panels twenty inches wide by thirty inches long, from one to four photographs being borne on each panel. The first panel shows four of the more important pathogenic germs with the text:

Many sicknesses, and particularly those which are catching or contagious, are caused by little living germs which grow in the body as a mold grows in jelly and make poisons that cause sickness and sometimes death. These germs are harmless-looking things like microscopic sausages, so small that millions might lodge on a pin point; yet they are the cause of tuberculosis and diphtheria, typhoid fever and cholera and many other diseases.

The second panel illustrates the sources of the disease germs, the sick person and the carrier [a patient in bed and a rather rough-looking individual carrying a milk bottle by the top in each hand]. The next panels show how disease is spread — by water [with a map of the famous Lowell epidemic]; by milk [a dirty cow barn]; by shellfish, by flies, by bathing in polluted water, and by contact. For the latter subject we posed and photographed children who came to visit the children's room at the Museum. In one, two little girls are doing sums with a common pencil. The legend points out that

These little girls are doing sums with one pencil, which each in turn without thinking puts in her mouth. Whatever germs are in the mouths will be well mixed and any disease which either child has will be likely to spread to the other.

In another panel one boy coughs in his hand and then with the same hand gives an apple to another boy who in the third picture eats it. Another panel shows two children waiting for a drink from a common drinking cup used by a larger companion. Next there follow a series of panels showing how such communicable diseases are prevented. One illustrates how milk may be pasteurized in the home. Another shows how to make a drinking cup by folding a square of paper. A table set for breakfast and a picture of a child washing her hands over a basin furnish texts for a discussion of the importance of using individual utensils and of personal cleanliness. Finally the series closes with pictures of an open sleeping-room window and of an outdoor gymnasium with the following legends:

Not all persons who get disease germs come down with disease. If the body is strong and well it can often defend itself against its tiny enemies. One way to keep well is to have plenty of air in all sleeping rooms. Windows should be open at the bottom to let cool fresh air in and at the top to let the hot bad air out. In winter a screen of cheesecloth may be made for the bottom opening to prevent uncomfortable drafts.

In the daytime the best way to keep well and able to resist disease is to stay out of doors in the fresh air and sunlight and strengthen the body by wholesome games.

A second album, deals more specifically with the bacteria and their relation to the life of man. The first panel in this series again shows certain typical bacterial forms. The next four illustrate the relation of bacteria to disease by means of maps and diagrams of water-borne epidemics, typhoid fever and cholera, and of milk-borne epidemics, diphtheria and tonsillitis. The sixth deals with the relation of bacteria to decomposition and the practical method of controlling putrefactive processes, illustrated by a view taken in a canning factory. The seventh photograph, of flax-

retting in the river Lys in Belgium, furnishes the text for a discussion of the use of microbes in the arts and industries. The eighth and last illustrates the effect of soil-inoculation with nitrogen-fixing bacteria by two samples of pea plants grown in poor soil, with and without microbial aid.

This album is accompanied by a case of bacterial cultures showing how the bacteria appear in mass growths and how we detect them in water, milk and air. The cultures are mounted on flat wooden backs about twelve inches by fourteen inches with braces so that they can be stood up on the teacher's desk. Each case holds three of these stands which fit neatly into a box easily carried by hand. The first stand bears a series of streak cultures showing the form and color of the surface growth of half a dozen striking species and illustrating the production of gas and acid in sugar media by bacteria, the coagulation of milk, and the destruction of a piece of meat by putrefactive forms. The second stand bears two plates showing colonies developed from a comparable portion of a good and a bad water and two plates showing colonies developed from a raw and a pasteurized milk and one showing colonies developed from germs deposited by the feet of a fly in walking across the plate. The third stand bears five sterile agar plates which may be opened and infected in the classroom with dust, saliva, finger prints or the like in order to show the children the resulting growth.

The third of our traveling exhibits deals with insect-borne disease. In the album the various life stages of the mosquito — egg, larva, pupa and adult — are shown with photographs making clear, for the larva and adult, the differences between *Culex* and *Anopheles*. The control of these pests is illustrated by photographs of a swamp in New Jersey before and after drainage, by a picture of a mosquito squad oiling catch basins and by one of Mr. W. L. Underwood's remarkable photographs of a goldfish eating larvae. A diagram of the elimination of yellow fever in Havana, shows what may be accomplished by mosquito control in tropical sanitation. In a similar way are shown the life stages of the house-fly and its breeding places (a dirty stable and a back-yard dump). An efficient fly trap is illustrated and briefly explained and the importance of cleanliness in doing away with fly breeding is indicated by a series of photographs of the way in which garbage is cared for in the city of Minneapolis. The sanitary importance of fly-fighting in the South is emphasized by a diagram of the recent reduction of the typhoid death rate in Jacksonville. The album closes with large photographs of the louse and the flea as carriers of typhus and bubonic plague.

This album is accompanied by a series of vials in which actual specimens of the four life stages of the fly and of the *Culex* and *Anopheles* mosquitoes are mounted in glycerine-agar so that the pupil may study them for himself and learn to recognize them in the back yards and pools near his own home.

All this is of course only a beginning of what we may hope to do, even for the high schools. We have as yet scarcely touched the great underlying problem of the elementary schools where it is most vital that a sound basis should be laid for healthy living and where at present (in New York City) fifteen minutes a week is the maximum time that can be spared for theoretical instruction in hygiene. We do feel however that we have done enough to show that museum methods of instruction may be made of use in the teaching of school hygiene and sanitation. President Osborn of the American Museum, in speaking of its general educational work has said, "Already the child can see here what Aristotle dreamt of but never saw, and what Darwin and Huxley put into prophecy but did not live to see." So in our special field we may teach the child the causes of diseases which were mysteries to Pasteur and Koch. We have the opportunity to spread through the great school population of New York a knowledge of the laws of health such as Hygeia never vouchsafed to any of her devotees in any other age than ours.



## SEA LAMPREYS AND THEIR NESTS

By Louis Hussakof

THERE has recently been placed on exhibition in the hall of fishes a group representing the nesting habits of the sea lamprey, the largest, and in some regards the most remarkable, of all the lampreys. The group represents three large lampreys building a nest among the pebbles at the bottom of a clear, shallow stream, close to the bank and partly under a half-submerged log. The studies for the group were made



The Nissequague River at Smithtown, Long Island, where the studies on the nesting habits of the sea lamprey were made. A large nest was found among the pebbles directly under the bridge

on the Nissequague River at Smithtown, Long Island, and the group is a faithful representation of the scene as it occurs in nature.

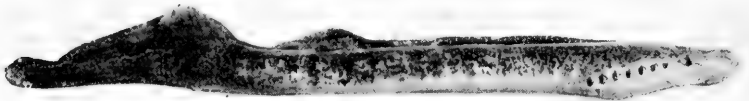
Lampreys are among the most remarkable creatures of our waters, both for their extraordinary nesting habits and their anatomical structure, which is of great importance in the study of the lower vertebrates. Although eel-like in appearance, they are not eels; in fact they are not even fishes, in the strict sense of the word. They lack paired fins — the fins which correspond to the arms and legs of higher vertebrates — and they have a suctorial mouth which is of quite different structure from that of fishes. For these reasons and for others of a more technical kind, lampreys, together with their allies the “hags”, are separated from the true fishes as a distinct class, the Cyclostomata (in allusion to the round mouth).

There are four or five species of lampreys inhabiting the lakes and streams of the northern hemisphere, and one occurs in the sea. The latter is found on the coasts of both Europe and America, and is the largest of all the lampreys, reaching a length of nearly three feet.

In the spring sea lampreys enter fresh water in order to spawn. A clear, shallow stream with a pebbly bottom is usually selected, and here they build their “nests” — circular depressions in the river bottom about three feet across and a few inches deep at the center. Two or more lampreys are usually engaged in building a single nest, and their behavior is most extraordinary. John Burroughs characterized it as “one of the most curious spectacles” he had ever seen in our streams.

The rooting up and transporting of the pebbles to make the nest is done entirely with the mouth, the tail not being used to fan it into shape as is the case with certain fishes, such as the sunfish or the black bass. The lamprey seizes a pebble or a stone with its suctorial mouth, lifts it from the bottom, turns in a graceful curve and carries it out of the nest; and then immediately returns for a second pebble. Sometimes instead of carrying the pebble out, it charges head-on against it and pushes it up the incline and out of the nest. It is surprising how large a stone a lamprey will thus transport; I have picked up half a brick as it was released by a lamprey after being tugged out of the nest.

The eggs are scattered broadcast over the nest. They are very small (about  $\frac{1}{24}$  of an inch in diameter), pear-shaped, and so much like sand grains

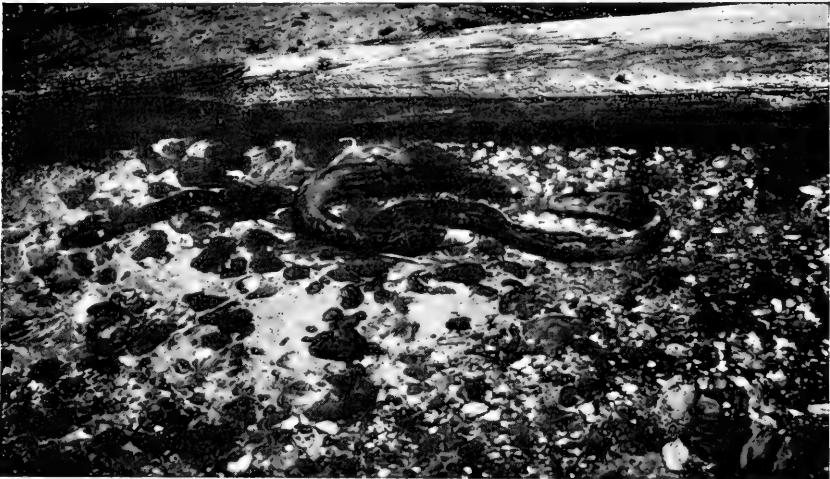


The sea lamprey is not an eel, and in fact, not really a fish. Together with the closely related “hags,” it belongs to a distinct class — the Cyclostomata (in allusion to the round sucking mouth)

in color that it takes a trained eye to discover them. They hatch in about a fortnight, long after the nest has been deserted and scattered by the flow of the river. The larvæ differ greatly from the adults; so much, in fact, that they were once thought to be a distinct species, which was named *ammocetes*.

The ammocetes lie in burrows in the sand, feeding on microorganisms. They live thus for three or four years before they metamorphose into lampreys. The external changes in this process consist in the development of eyes, modifications in the form of the mouth, gills and of several other organs. Internally the transformation is no less profound. When the metamorphosis is completed, the lampreys migrate to the sea. Here they live three to four years — the exact period has not been definitely ascertained — until they reach maturity and are ready to run up streams for the purpose of spawning.

After spawning the lampreys, it appears, die, none of them returning again to the sea. One may often encounter dead lampreys tangled in the tall grass here and there along the river bank, where they had crept in to die. There are several causes for their death after spawning, the most important one perhaps being, that they are attacked by microorganisms through the wounds which they have inflicted upon each other with their rasping teeth while on the nest, and that in their weakened condition due to the labor of tugging and transporting stones, they are unable to resist the inroads of the disease and therefore soon succumb.



Three lampreys engaged in building a nest. They root up and transfer the pebbles, thus forming a circular depression some three feet across and a few inches deep. Photograph of living lampreys on the bottom of the Nissequague River. The new group in the American Museum is a faithful reproduction of this scene

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Patron*, MR. PAUL J. RAINEY;

*Fellow*, MR. EMERSON MACMILLIN;

*Life Members*, DR. PERCIVAL LOWELL and MESSRS. STANLEY DOTY BROWN, RUSSELL HASTINGS MILLWARD and EDWARD C. PARISH;

*Annual Members*, MRS. F. SCHNIEWIND, MISSES MARY L. JOBE and JOSEPHINE M. WEIL, DR. G. L. ROHDENBURG, PROF. WILLIAM M. SLOANE and MESSRS. JAMES ARTHUR, JEROME J. HANAUER, HUBERT A. JUDGE, ROBERT MCGREGOR, GEORGE OBERDORFER and JAMES SPEAR.

UNDER the title "My Oceanographical Cruises," His Serene Highness, the Prince of Monaco spoke before the members of the American Museum and of the New York Academy of Sciences in the Auditorium of the Museum on the evening of October 27. He briefly reviewed his work of the past twenty-five years, from the time he began in a small schooner manned by two sturdy sailors, down to his work on the "Hiron-delle" a twin-screw steamer of 1600 tons, carrying a staff of trained scientists, provided with laboratories and equipped with every device not only for studying the profoundest depths of the ocean, but also for capturing the fishes and cetaceans at the surface and exploring the air for miles above.

With the aid of slides and motion pictures the Prince described the methods by which the air currents are studied, the conditions of moisture and temperature being registered by instruments raised by twin balloons so prepared that eventually one bursts, the other dragged downward by the weight of the apparatus, marking the spot where it floated. The methods were illustrated of making deep-sea soundings, securing samples of the sea bottom at a depth of two or three miles and at the same time obtaining records of the temperature and samples of the water at various levels. The lecture concluded with an account of the denizens of the deep sea and the methods by which they are secured. In this branch of work the Prince of Monaco has been particularly successful, obtaining by cunningly devised nets and traps hundreds of specimens where others have secured but two or three.

DR. BRUNO OETTEKING, who has received training in some of the best anthropological laboratories of Germany and Switzerland, is working over the skull collection made in the course of the Jesup expedition. The data are to be used in the final report on the physical anthropology of the Jesup expedition.

THE cover design of this number of the JOURNAL is from a photograph by Mr. Carl E. Akeley, taken in 1910 on his latest expedition to Africa. It represents a herd of impalla come to drink in the Tana River and is to serve as a study for a portion of the background of a hippopotamus group planned by Mr. Akeley as one of a series for the new African hall in the American Museum. The antelopes approach the water timidly, probably smelling the tracks of lions and leopards which use the same runways to the river, and startled into fear of these enemies behind them and of the crocodiles in the water in front of them, by every sound of the monkeys in the trees and every movement of the hippos on the sand-bars a few yards away.

ON Friday evening, November 21, there will be a public meeting in the large auditorium of the Museum under the joint auspices of the American Museum of Natural History, the American Scenic and Historic Preservation Society, and the National Committee for the Preservation of the Yosemite National Park, with the coöperation of many civic organizations throughout the United States, to protest

against the act pending in Congress proposing to grant the Hetch-Hetchy Valley in the Yosemite National Park for water-storage purposes. Addresses by Prof. Henry Fairfield Osborn, president of the Museum; Dr. George F. Kunz, president of the Scenic Society, Mr. Robert Underwood Johnson, chairman of the National Committee; Dr. Douglas W. Johnson of Columbia University, and others will discuss the economic, geological and scenic features of the question at issue. The picturesque beauties of the Yosemite will be illustrated upon the screen. The importance of the occasion is indicated by letters from ex-President Taft, Cardinal Gibbons, President-emeritus Eliot of Harvard University and other distinguished citizens in sympathy with the meeting.

ON the evening of November 3, the section of Geology and Mineralogy of the New York Academy of Sciences will entertain the members of the Academy and its Affiliated Societies at a general meeting and reception to be held in the auditorium and the adjoining Eskimo hall of the Museum. The speaker of the evening will be Prof. Ellsworth Huntington of Yale University, who will discuss the problem of climatic changes in the past, outlining and illustrating by lantern slides the evidence as shown in his investigations in central and western Asia and in California and the Southwest. This entertainment of the Academy in November by the Section of Geology is the first of a series of four social evenings to continue through the winter months. The further meetings will be under the auspices respectively of the Sections of Biology, Astronomy and Anthropology.

DR. RUDOLF WAGNER, who is about to undertake an investigation of the several Spanish dialects in Mexico and to collect folklore from both the Indian and the Spanish-speaking populations, recently visited the Museum, paying especial attention to the Mexican hall.

THE NATIONAL ASSOCIATION OF AUDUBON SOCIETIES met at the Museum on October 28, when the following officers were elected: Mr. William Dutcher, president; Dr. T. S. Palmer, first vice-president; Dr. F. A. Lucas, second vice-president; T. Gilbert Pearson, secretary; and Jonathan Dwight, treasurer. In addition to these members the following were elected to the Board of Directors: Dr. J. A. Allen, Dr. George Bird Grinnell, Dr. Frank M. Chapman, Mrs. Mabel Osgood Wright, Mr. W. W. Grant and Mr. Charles Sheldon. The report of the secretary showed that the Society has expended more than \$80,000 in bird protection during the last year. Junior Audubon classes under the direction of the Association have been organized and 52,000 members are enrolled. The Board of Directors at this meeting offered a reward of \$250 for the arrest and conviction of the man who shot John C. Reinbold, game warden in Hackensack, New Jersey. One of the important features of the Association's work during the past year has been its participation in arranging for the Niobrara Reservation in Nebraska, where a herd of elks has been established.

THE fourth annual Teachers' Day of the American Museum of Natural History will be held at the Museum on the afternoon of Saturday, November 8. There will be brief addresses in the auditorium by Dr. John H. Finley, Commissioner of Education of the State of New York and Dr. William H. Maxwell, Superintendent of the Public Schools of New York City, after which the guests will visit the bird and mammal halls and gather for an informal reception and afternoon tea in the north bird hall.

THE AMERICAN ORNITHOLOGISTS' UNION will convene November 10 at the Explorers' Club for the first meeting of its thirty-first annual congress. The program of the three days of the Congress will include sessions for the presentation of

scientific papers, an inspection of the ornithological laboratories of the American Museum, and a visit to the Zoölogical Park and Aquarium at the invitation of the New York Zoölogical Society. The members of the Union will be the guests of the Linnean Society of New York each day for luncheon at the Museum.

MR. N. C. NELSON, having returned from his explorations of Puente Viesgo, almost immediately proceeded to resume his archæological reconnaissance in the Southwest.

THE first of a series of science stories for children of members of the Museum will be given on Saturday morning, November 1. Through the courtesy of Mr. Robert W. Priest of the Gaumont Company, Limited, of London, the Museum has secured the privilege of showing in this lecture the motion pictures taken by Herbert G. Ponting, F. R. G. S., on the last expedition of Captain Scott to the South Pole. The pictures give a marvelous revelation of the habits of the seals, penguins and gulls of the Antarctic, which having no acquaintance with man, have in consequence no fear of him, so that Mr. Ponting was able to approach within a few feet of them in taking the pictures.

THE fourth annual exhibition of the New York Aquarium Society was held at the Museum from October 6 to 12. The exhibition consisted for the most part of tropical fresh-water fishes which were attractively displayed in aquaria and looked as though they were swimming in quiet streams among the fine vegetable life of their natural habitat. Among the representatives of the *Characin* family were the rare *Myletes* which look like silver coins, the *Leporinus* with their long vertical stripes and the *Gasteropelecus*, an extraordinary-looking fish with a deep bladeliike breast. There were various species of the *Cichlids*, the most notable of which were the *Pterophyllum scalare*, a little-known fish with elongated fins, which was brought from the interior of Brazil and exhibited in this country for the first time this year, and the "mouth-breeder" of Africa which carries its eggs in its mouth until they are hatched. The *Tetodon cutcutia* which had never before been exhibited in the United States is especially rare and interesting. It has a hard beak like a parrot and is called a "blow-fish" from its habit of swelling up to intimidate its enemies. This is one of the few fresh-water representatives of an abundant salt-water group. The tooth carps family was represented by many forms, among them the rare *Fundulus gularis*, the male of which has a brightly colored tail, and the *Belonesox* which, more than any other species in the family, shows a close resemblance to the pickerel in feeding habits. Other rare and equally interesting fish were exhibited and much credit is due to the Society for its success in assembling a collection so unique.

THE annual fall exhibition of the Horticultural Society of New York opened for private view at the American Museum on the evening of October 31 and continued for public view both day and evening through November 4. The display which was visited by some 170,000 people, was the most splendid of recent years, including several bush chrysanthemums fourteen feet in diameter and bearing two thousand or more flowers each. One of the minor exhibits occupying a small alcove in the hall of the Indians of the Plains was presented by the Park Department of Manhattan and Richmond on the work of the Bureau of Children's School Farms. Descriptions of the shop work and the garden work, photographs of the children at work in the garden plots and samples of the vegetables and fruits grown in the gardens went far toward convincing the visitor that probably in no better way than this can the children of a great city be taught elementary agriculture and forestry, manual training, physical culture, and even sanitation and hygiene.

# The American Museum Journal

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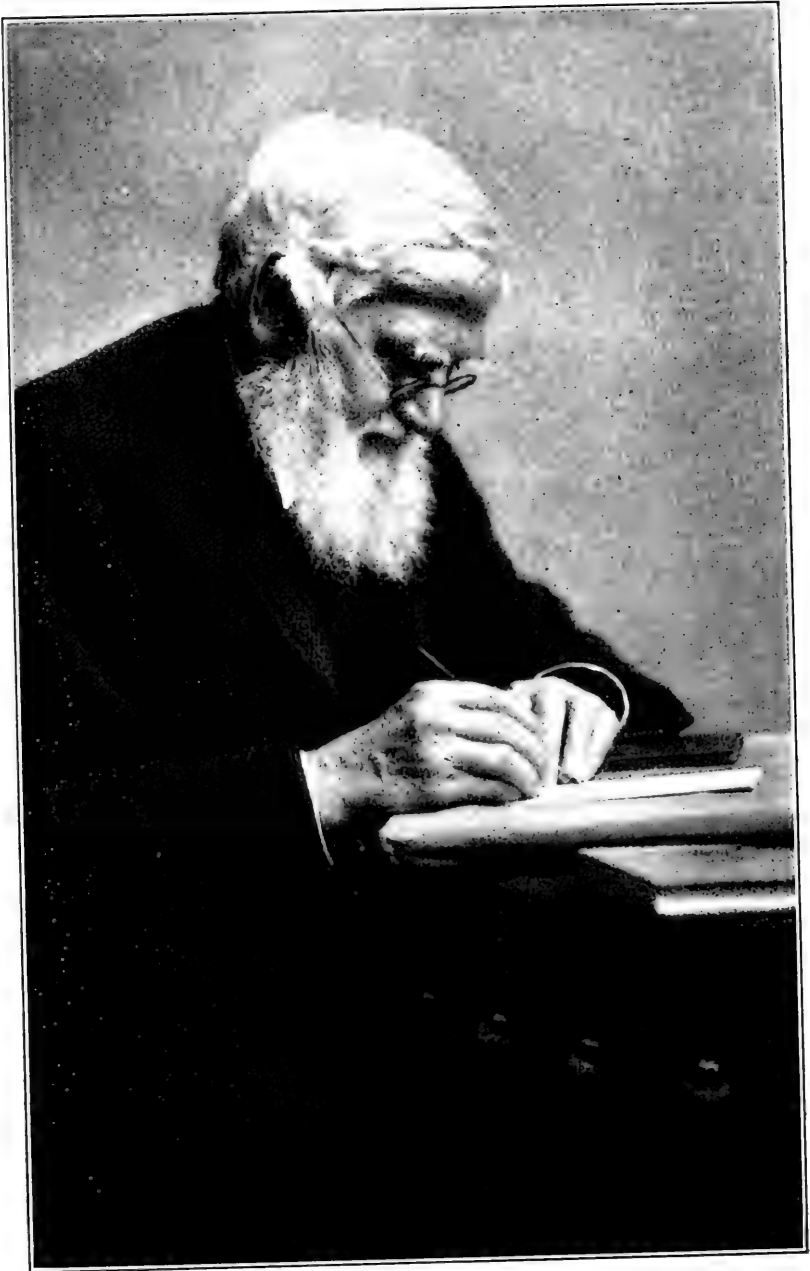
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MARY CYNTHIA DICKERSON, *Editor*

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**The Journal is sent free to all members of the Museum.**



*Alfred R. Wallace -*



## A GREAT NATURALIST ALFRED RUSSEL WALLACE, 1823-1913

By Henry Fairfield Osborn

THE nineteenth century in Great Britain, the Victorian Age, will be compared in history with the greatest intellectual periods in the history of Athens, of Rome and of Florence. Brilliant as were England's achievements in art, literature and the spreading of civilization, her achievements in science outshine them all. No country has ever produced such a constellation of stars of the first magnitude in the same brief period of time, especially in the sciences of geology and biology. The dominant figure of course is that of Darwin, whose influence upon the world of thought is to be compared with that of Aristotle only. Anticipating and surrounding Darwin were members of an unrivaled group of men, beginning with Sir Charles Lyell, a geologist, and including Sir Joseph Hooker, the botanist, Alfred Russel Wallace, the naturalist, and Thomas Henry Huxley, the anatomist and natural philosopher.

Wallace, the last survivor of this remarkable group, died on November 7, 1913, in the ninety-first year of his age and the sixty-fourth year of service and discovery. He followed by only a few months another member of the group, Sir Joseph Hooker, who was present at the Darwin celebration at Cambridge in 1909, the centenary of the birth of Darwin.

Because the fame of Wallace rests chiefly on his codiscovery with Darwin of the theory of natural selection he is sometimes thought of as Darwin's contemporary but he was actually fourteen years younger and made the discovery of natural selection twenty years later than Darwin. He was always the first to recognize Darwin's seniority and leadership. In his remarkable journeys in South America and in the Malay Archipelago, filling the years 1848 to 1862, Wallace was influenced by Darwin's classic work, best known as the *Voyage of the Beagle*.

The simultaneous publication of the law of natural selection independently discovered by these two great naturalists was followed on the part of Wallace by a lifetime of devotion to this chief principle of Darwin's special theories of the causes of evolution. While Huxley was the stalwart defender of the evolution theory and of Darwinism in general without committing himself to either of Darwin's special interpretations of the theory, Wallace devoted himself continuously to the support of Darwin's special hypotheses. Yet almost from the first he differed from Darwin in some very important particulars. He never could bring himself to believe that the mind and spirit of man were the results of the same evolution process as that which had developed his bodily structure and that of all the lower orders of animal

The half tone of Alfred Russel Wallace is used by courtesy of *Popular Science Monthly*

creation. As early as 1864 he advanced the hypothesis that so soon as man learned to use fire and make tools, to grow food, to domesticate animals, to use clothing, and to build habitations, the action of natural selection was diverted from his body to his mind and that thenceforth his bodily form remained comparatively stable while his mental faculties improved.

Five years later Wallace had definitely broken away from Darwin's conceptions with regard to natural selection and developed the opinion that this law is wholly inadequate to account for several of the bodily as well as psychical characteristics of man, such as his soft and sensitive skin, his speech, his color-sense and his mathematical, musical and moral attributes. He drew the inference from this class of phenomena, that a superior intelligence has guided the development of man in definite directions and for special purposes, just as man guides the development of many animal and vegetable forms.

Another striking divergence of the views of Wallace from those of Darwin related to the theory of the origin of the very striking differences which exist between males and females in many divisions of the animal kingdom. Darwin in his theory of sexual selection advanced the idea that the female was attracted by the brilliant and gaudy appearance of the males, as for example among birds, and that throughout the animal kingdom generally, beauty of coloring is especially characteristic of the males, is consciously perceived by females and thus selected. Wallace, on the other hand, sought to explain all the instances of brilliant and gaudy coloring on other principles. Thus in 1868 he propounded an original explanation of the quiet colors of nesting birds, pointing out that when the nest is exposed to view the female is always inconspicuous in coloring or imitative of its surroundings, while the male of the same species may be conspicuously or gaudily colored. Among other varieties of birds where both the sexes are conspicuously colored he noticed that the nest is such as to completely conceal the sitting bird.

Wallace specialized in the interpretation of the coloring of animals. He developed the theory of mimicry, or protective resemblance, the conception of which we owe chiefly to Bates and to Müller. One of his famous observations is that of mimicry in the leaf butterfly, which we find described in his delightful volume of 1869, the *Malay Archipelago*. In his own language his first observation of *Kallima paralekta* was as follows:

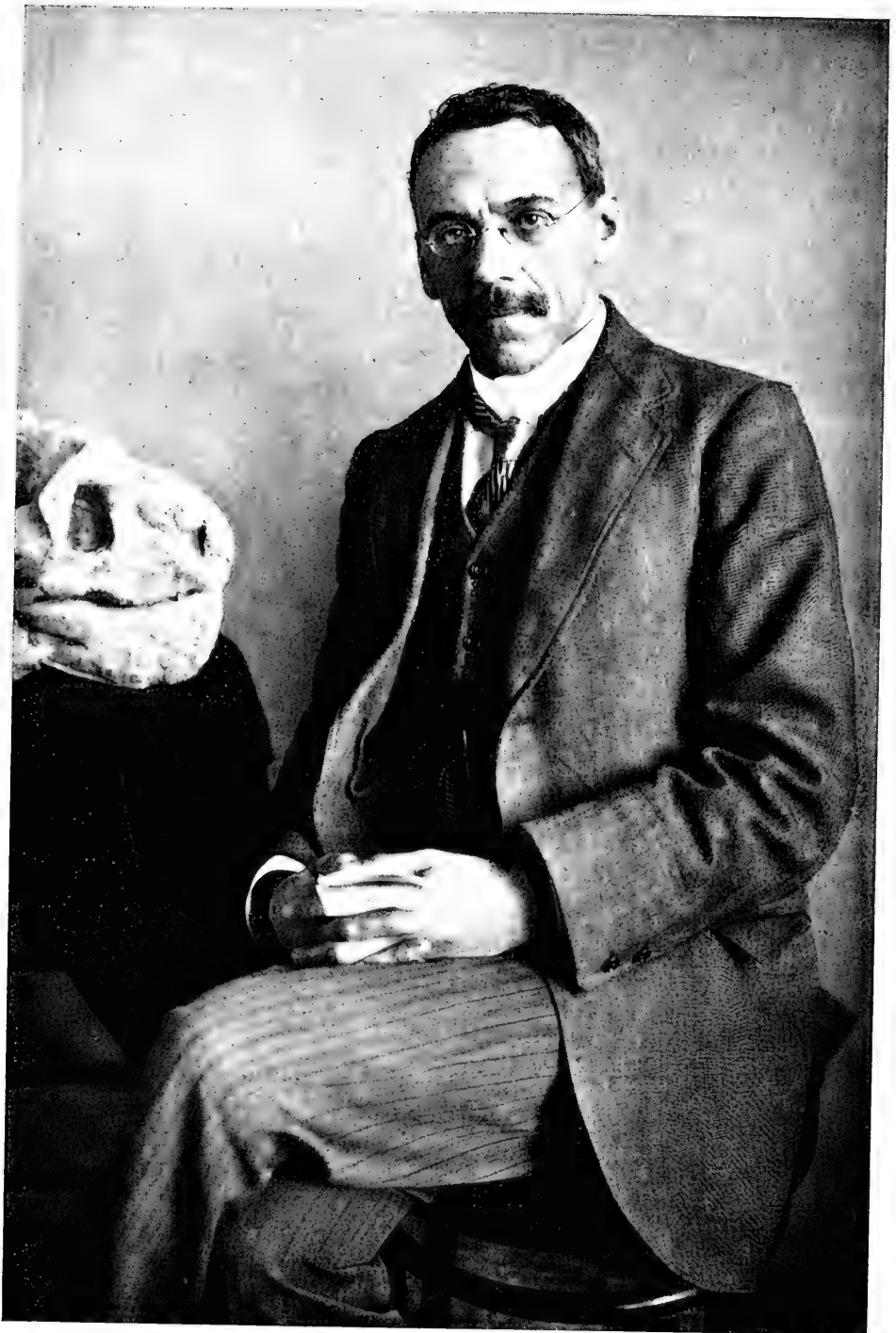
This species was not uncommon in dry woods and thickets, and I often endeavored to capture it without success, for after flying a short distance it would enter a bush among dry or dead leaves, and however carefully I crept up to the spot I could never discover it till it would suddenly start out again and then disappear in a similar place. At length I was fortunate enough to see the exact spot where the butterfly settled, and though I lost sight of it for some time, I at length discovered that it was close before my eyes, but that in its position of repose it so closely resembled a dead leaf

attached to a twig as almost certainly to deceive the eye even when gazing full upon it. I captured several specimens on the wing, and was able fully to understand the way in which this wonderful resemblance is produced. . . . All these varied details combine to produce a disguise that is so complete and marvelous as to astonish every one who observes it: and the habits of the insects are such as to utilize all these peculiarities, and render them available in such a manner as to remove all doubt of the purpose of this singular case of mimicry, which is undoubtedly a protection to the insect.

Another line in which Wallace ranks as one of the greatest naturalists is the geographic distribution of animals, beginning with his earliest observations in the *Malay Archipelago* of 1869 and closing with the publication of his charming book *Island Life*, which appeared in 1881.

Wallace like Darwin enjoyed the closing years of his life in the quiet surroundings of a beautiful English country home, and continued even to his ninety-first year to be a great force in the world's thought. His powers as a writer were prodigious and in rapid succession in his later years he brought out his volumes *My Life*, the *Wonderful Century*, the *World of Life*, and *Social Environment and Moral Progress*. In the *World of Life* he no longer believes in the Darwinian explanation of natural selection as adequate to account for the wonderful adaptations which we find in the animal world. He regards life as "a manifestation of creative power, directive mind and ultimate purpose." He thus returns in his later years to the teachings of his boyhood, to those which prevailed before the publication of the *Origin of Species*. His final creed is found in one of the closing paragraphs of the *World of Life* (p. 421):

In the present work I have endeavoured to suggest a reason which appeals to me as both a sufficient and an intelligible one: it is that this earth with its infinitude of life and beauty and mystery, and the universe in the midst of which we are placed, with its overwhelming immensities of suns and nebulae, of light and motion, are as they are, firstly, for the development of life culminating in man; secondly, as a vast school-house for the higher education of the human race in preparation for the enduring spiritual life to which it is destined.



DR. ROBERT BROOM

Dr. Broom, Croonian lecturer before the Royal Society, London, in 1913 and late professor of geology and zoölogy (1903-1910) at Victoria College, Stellenbosch, South Africa, is the world's chief authority on South African palæontology. He has been in America for some months engaged in important comparative research on his almost unequalled private collection of South African Permian reptiles and the American Museum's large Permian collections from North America

## SOUTH AFRICAN FOSSIL REPTILES

FOSSILS EXCAVATED FROM THE BLUE SHALES OF SOUTH AFRICA PROVE REPTILES TO BE THE ANCESTORS OF MAMMALS. THESE MAMMAL-LIKE REPTILES LIVED MOSTLY BEFORE THE APPEARANCE OF DINOSAURS, CROCODILES, LIZARDS AND TURTLES

By Robert Broom

Late professor of geology and zoölogy, Victoria College, Stellenbosch, South Africa

PROBABLY no question is so interesting to biologists as the origin of mammals, and few questions are more interesting to the layman. Up to 1859 when Darwin published the *Origin of Species* very few worried much about the origin of anything. The prevailing belief was that somewhere about the year 4004 B. C. the Almighty created all animal forms just as we find them to-day. A few scientists had before this time come to the conclusion from their examination of the fossils found in the rocks that there were serious difficulties in the old view, and many attempts were made to harmonize the scientific facts with the old traditions, but for the most part those who held views differing from their fathers were cautious in expressing them. After 1859 the full and free discussion of the problems gradually led to a general belief in evolution and scientists began to try to trace lines of descent. With some groups the lines of evolution were fairly manifest but with the warm-blooded animals the case presented the greatest difficulty. No other forms seemed at all nearly allied and while it was natural to assume that they must either have sprung from lizard-like reptiles or salamander-like amphibians, there was no clear evidence to decide the question.

In 1876 Owen in describing the fossil reptiles of South Africa pointed out numerous mammal-like characters seen in them and in 1880 definitely expressed the view that the primitive mammals living to-day in Australia are the direct descendants of a reptilian ancestor such as he had described. Huxley on the other hand favored the descent of the mammals from a salamander-like form and the contest between those who believe them descended from amphibians and those who look on reptiles as the ancestors has been waged ever since — sometimes rather vigorously.

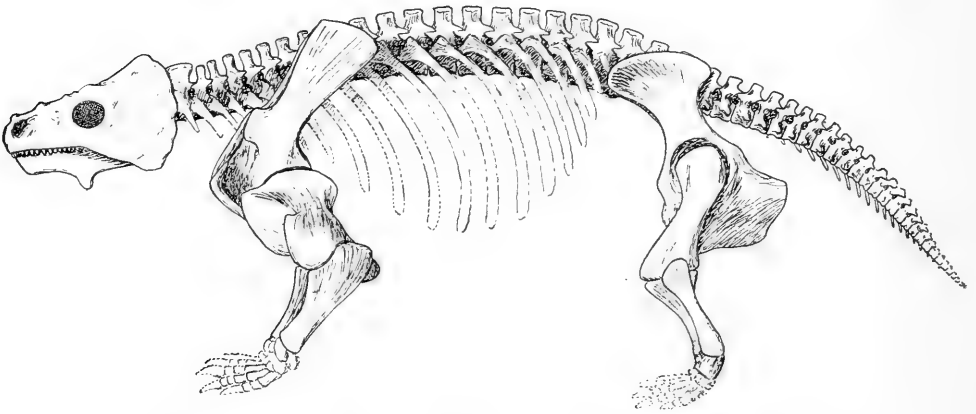
When Cope in 1880 studied the remarkable Pelycosaurus, fin-backed reptiles found in the old Permian rocks of New Mexico and Texas, he came to the conclusion that he had found, if not the mammalian ancestors, at least forms allied to them, and in this I believe he was quite correct.

Between 1888 and 1905 Professor Osborn published a considerable number of papers dealing with the origin of mammals in which he argued that the ancestor of the mammal was probably a member of that group of very mammal-like reptiles found in South Africa and called Cynodonts. This view of Osborn's seems at first sight opposed to that of Cope's but in all

probability both views were correct, the Pelycosaurs being a side branch from a direct line very near to the early mammalian ancestors, the Cynodonts being probably the immediate ancestors of the mammal.

Baur who worked here in America and died some fifteen years ago, was in favor of the reptile origin. Seeley adopted a rather curious view. He believed that the egg-laying mammals came from reptiles but that other mammals arose from amphibians. On the whole the Germans have favored the amphibians as ancestors, while English opinion although somewhat divided, has mainly been in support of the reptilian theory. The majority of Americans, doubtless influenced by Cope and Osborn, have always favored the descent of the mammals from a reptilian ancestor.

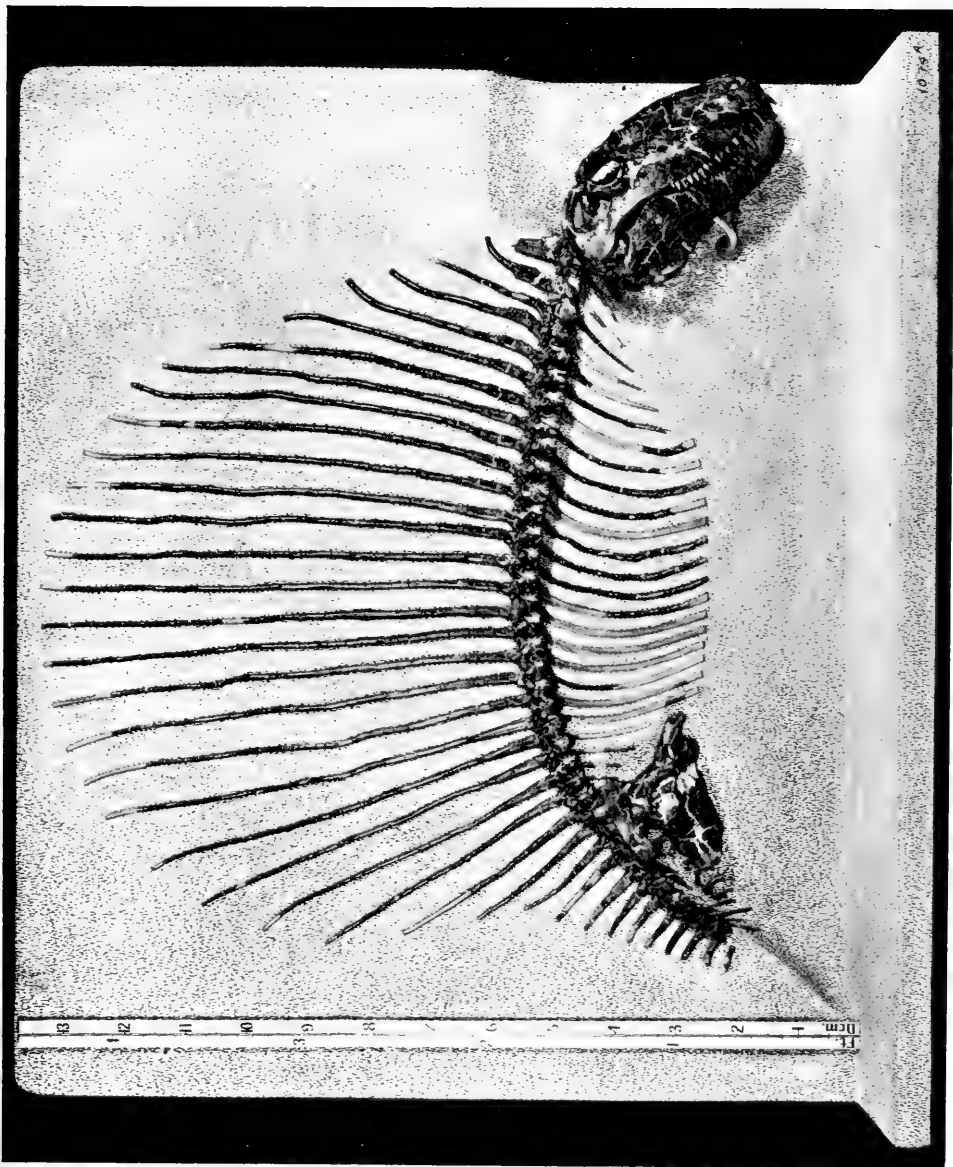
I became interested in the question in 1885 and practically resolved then that I would contribute what I could to the solution of the problem. In 1892 I went to Australia and spent some years in studying the egg-laying



*Pareiasaurus serridens* Owen. A restoration of a skeleton founded on the specimen in the South African Museum. Though not a mammal-like reptile it resembles them in having powerful limbs and the body lifted off the ground. The skeleton is from eight to nine feet in length and stands about three and one-half feet high

mammals and marsupials. In 1897 I went to South Africa and have been working in that region for the last seventeen years. In these seventeen years nearly every specimen that has been picked up there has passed through my hands.

We call our South African deposits the Karroo formation — naming it from the Karroo desert — and there is probably none in the world of greater interest. This formation is extensive, covering the greater part of the interior of Cape Colony, almost the whole of the Free State and much of the Transvaal, Basutoland and Natal, an aggregate area of 200,000 square miles. The formation is composed of bluish shales much like slate in color and of mudstones and there is little doubt that it has been formed of the



AN AMERICAN MAMMAL-LIKE REPTILE

Incomplete skeleton of *Dimetrodon incisivus* Cope, as mounted in the American Museum of Natural History. This is one of the largest of the American primitive mammal-like reptiles. It was described by Cope who correctly recognized its mammal-like affinities

mud brought down into a large basin by a huge river such as the Amazon. Besides being of great extent, this deposit is also of great thickness, in some parts probably as much as 10,000 feet thick.

If you look upon this area as a series of rocks 10,000 feet thick and 200,000 square miles in area, and imagine it the face of a book of the history of the world, you see that it is simply a matter of our turning over the pages. There is not another part of the world that will give the records so completely — a continuous record of the land animals of the world for about three million years. Sometimes we cannot read the record clearly but we can make out most of it. This period is not only very fully recorded but there is no period of the world's history so interesting except the period when man came upon the earth. It is a period when crocodiles, lizards,



*Galepus jouberti* Broom, one-half natural size. A complete skeleton of a small member of the Dromasaurians, one of the earliest of the mammal-like reptiles. The head [at the left below] is folded back so that in this photograph it is seen very obliquely but with care all the rest of the skeleton may be easily traced

turtles and reptiles appeared for the first time; and the study of the records shows us the warm-blooded four-footed forms in the process of evolution.

The greater part of the Karroo formation lies in the center of Cape Colony. This large area has a scanty rainfall of from five to fifteen inches in the year but as most of the rainfall is due to thunder-storms during a short period, there are usually nine months in which no rain falls, and the vegetation is almost entirely composed of low Karroo bushes. The whole scenery is in many ways strikingly similar to that of Arizona. There are extensive plains that are almost dead level produced by the action of wind



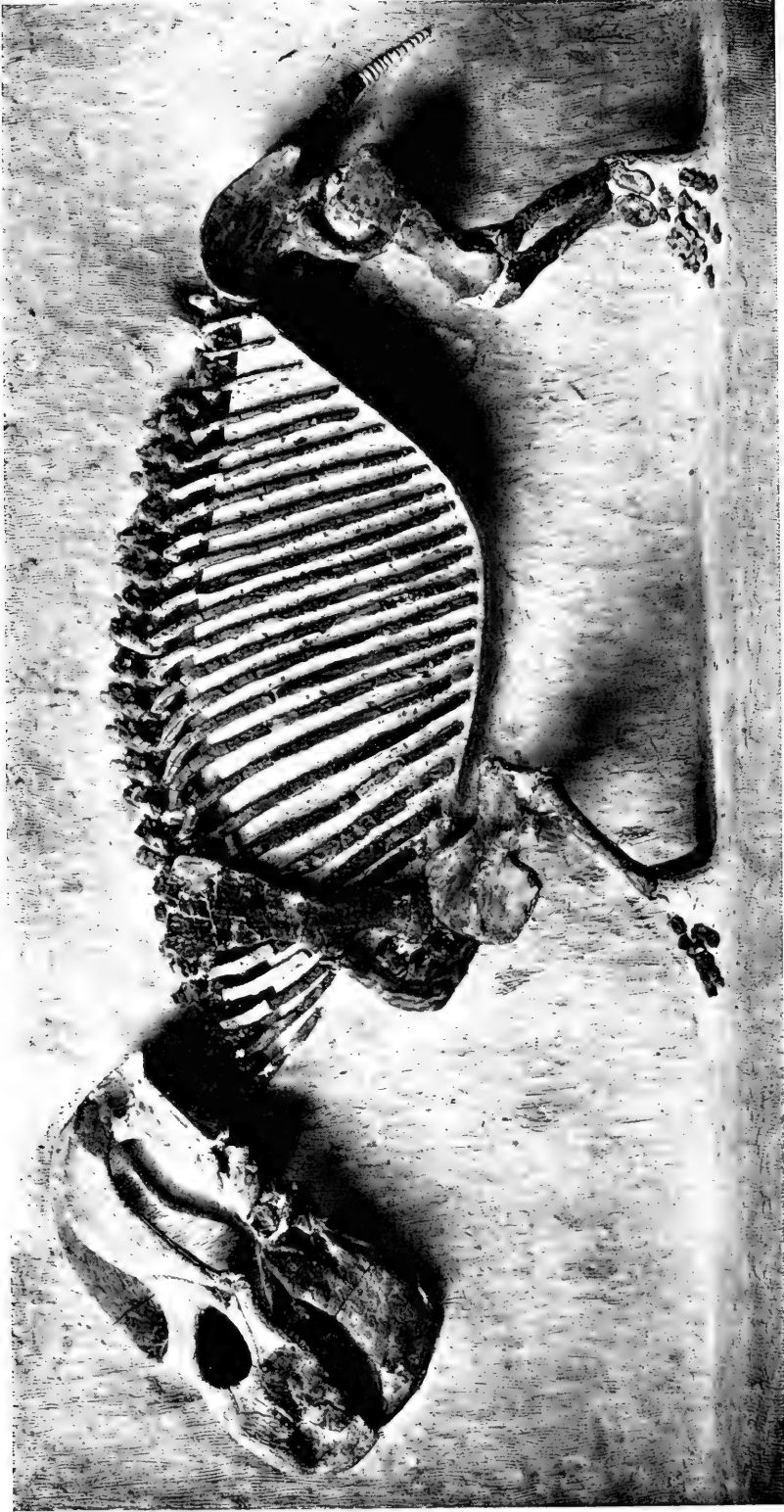
eroding exposed surfaces and filling up the hollows. Jutting out from the plains are the kopjes and mountains. These are preserved through being protected by sheets of igneous rock. In the plains, owing to the fact that almost the whole surface is covered with wind-blown dust, it is impossible to see any fossils except where the ground has been washed by a flood. On the sides of the hills in many places the shale is denuded of vegetation and exposed, and it is on these exposed slopes that most fossils are obtained. Unfortunately if a slope is steep it is extremely difficult to excavate any specimen even if discovered, the best localities being gentle slopes and the beds of rivers.

The distribution of fossils is very uneven. In some places one may travel and search over every slope of shale for forty miles without seeing a scrap of bone; in other places, sometimes in a small area of a few hundred square feet, a large number of specimens may be obtained. Bones are usually seen readily because their color is lighter than the shale. To many of the Dutch farmers and to members of their families, we are indebted for some of our best specimens, and even the Hottentot goatherds are often useful in spotting specimens while out on the hills watching their flocks.

The oldest animals we meet with in the Karroo formation in any number are of middle Permian age, shall we say of the year 18,000,000 B. C. These are of especial interest from the resemblance they bear to the American Permian reptiles from Texas and New Mexico. One of the largest and best-known animals is called *Pareiasaurus*. It is a large-limbed reptile, about nine feet in length and standing about three and one-half feet in height. In many points of its organization it shows affinities with the American reptile *Diadectes*, of which a mounted skeleton is to be seen in the American Museum. Another group of animals contemporaneous with *Pareiasaurus* is the reptilian group of Dinocephalians. These also were large reptiles with very powerful limbs. Although herbivorous and having no remarkable specialization of the spines of the vertebræ, they are nevertheless fairly closely allied to the very remarkable American fin-backed Pelycosaur, of which skeletons are to be seen in the American Museum.

One of the most striking peculiarities of the Karroo reptiles is that almost all agree with *Pareiasaurus* and the Dinocephalians in having powerfully developed limbs. How these have been evolved is a matter of doubt but there can be little question that it was this strengthening and lengthening of the limbs that started the evolution which ultimately resulted in the formation of the warm-blooded mammals.

The best-known and in some respects the most remarkable of the Karroo reptiles, belong to a group named by Owen, the Anomodonts, from their having horny beaks like the turtles or birds with in addition in many forms a pair of large walrus-like tusks. The first specimen was discovered as far back as 1844 and was called *Dicynodon* but although many skulls have been dis-



ALMOST COMPLETE SKELETON OF A MAMMAL-LIKE REPTILE

*Endothiodon uniseries* Owen. One-sixth natural size. The skeleton is slightly crushed, the limb bones especially being considerably flattened. This is the first nearly complete skeleton of an anamniote reptile that has been mounted and the attitude is probably very nearly correct. The toes of the hind feet are probably directed slightly outward, those of the front feet slightly inward. The resemblance of the attitude and the structure of the limbs and girdles it will be observed, are strikingly like those of mammals, and even the skull when allowance is made for the remarkable specialization of the beak, is not so very un mammal-like

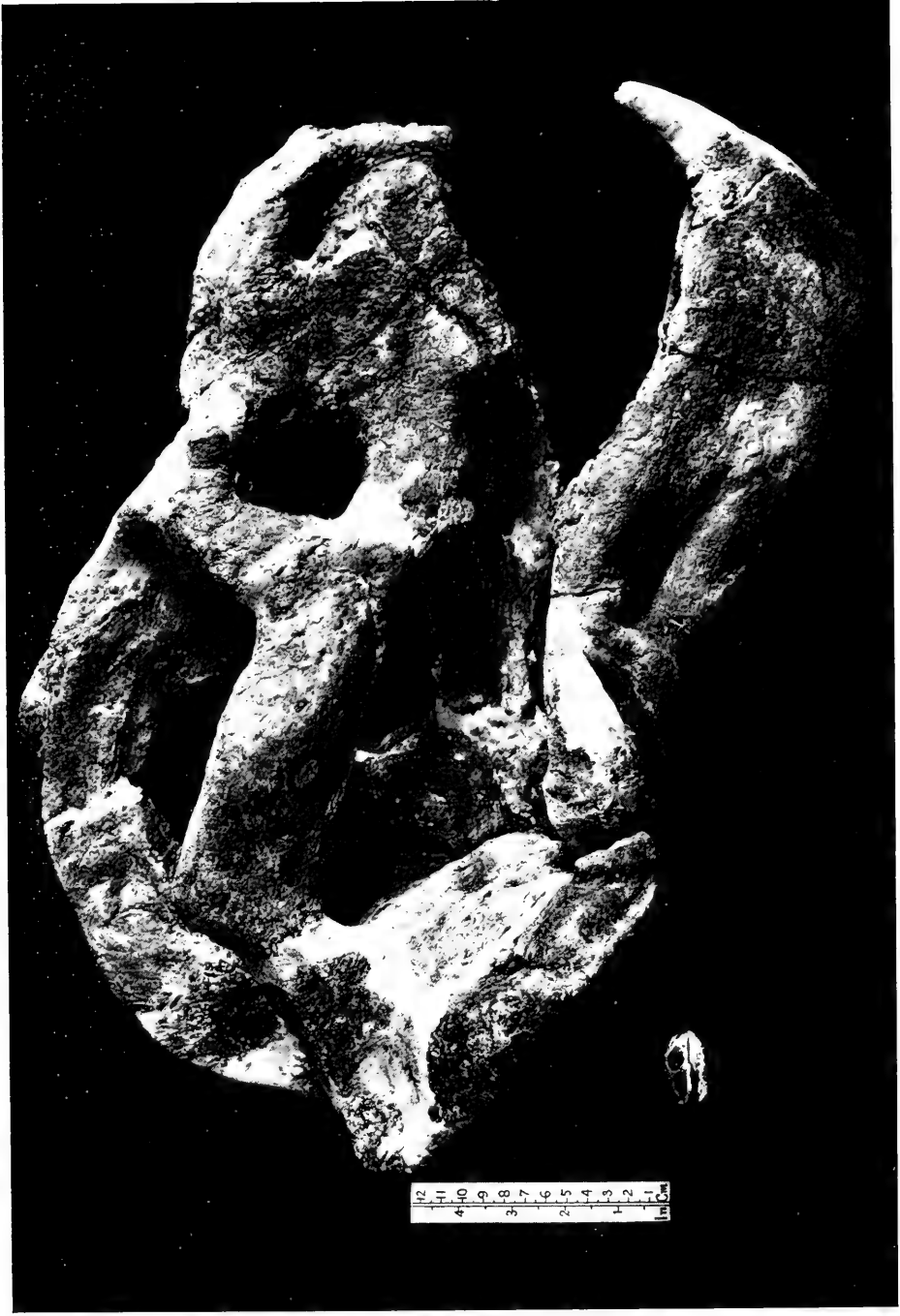
covered only three or four fairly good skeletons have been found. In limbs, shoulder and pelvic girdles and essential structure of the skull and in the number of joints of the toes, they strikingly resemble the mammals and although the curious development of the beak obscures the mammal-like character of the skull it is essentially built on the mammalian plan and there is little doubt that although the Anomodonts are a side offshoot from the mammalian stem they are closely allied to the mammalian ancestor.

A form nearly allied to *Dicynodon* is called *Endothiodon*. It has no



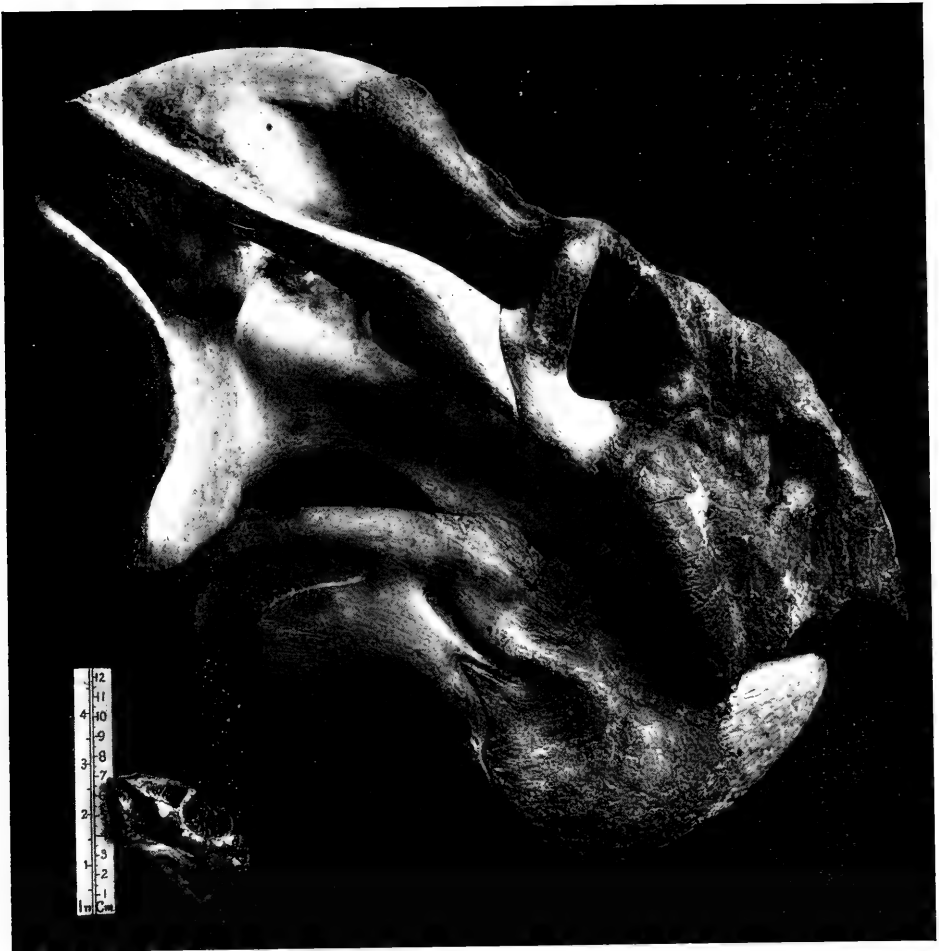
*Endothiodon uniseriatus* Owen. A more perfect skull than that belonging to the mounted skeleton [see page 340]

large tusk but a number of small teeth. Although much rarer than *Dicynodon*, fortunately an almost complete skeleton has been discovered which has recently been mounted in the Museum laboratories by Mr. Charles Falkenbach under my direction, and of which a photograph is given. The extremely mammal-like condition of the limbs is very manifest, and there is little doubt that the animal waddled about somewhat after the manner of the pigmy hippopotami of Liberia, seen at the New York Zoölogical Park.



CONTRAST IN SIZE AMONG ANCESTORS OF MAMMALS

*Endothiodon whatsi* Broom and *Emydops minor* Broom. The skull of the largest known form of *Endothiodon*, and of the smallest known of the Anomodonts



#### RELATIVE SIZE OF ALLIED SOUTH AFRICAN REPTILES

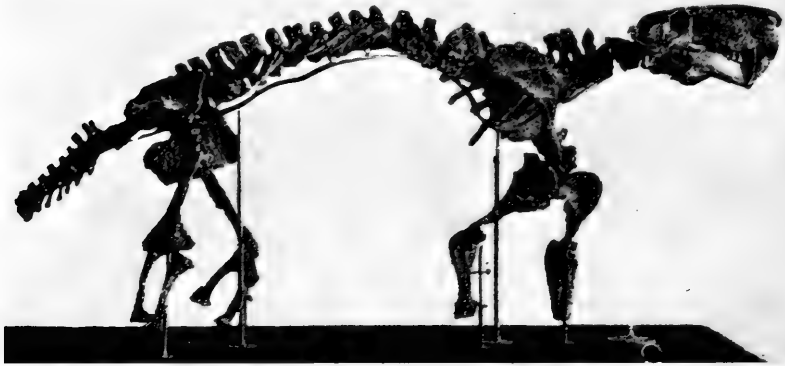
*Dicynodon whaitsi* Broom and *Diictodon galeops* Broom. The skull of one of the largest forms of *Dicynodon* and of one of the smallest allied forms. This specimen of *Dicynodon whaitsi* is a female in which the tusk does not project but it is present in the specimen deeply embedded in the bone

Formerly all those specimens of dicynodont reptiles in which there was no manifest tusk were placed in the genus *Oudenodon*. *Oudenodon* was also placed by Owen in a distinct family. For years the question was debated by all workers on South African reptiles whether *Oudenodon* might not be the female of *Dicynodon* and all have concluded that the evidence seemed rather to favor their being distinct forms. No known specimen of *Oudenodon* sufficiently resembled any known specimen of *Dicynodon* to be manifestly the female of that species. Within recent years however it has become quite certain that *Oudenodon* is the female of the tusked *Dicynodon*. In at least three species of *Dicynodon* we have a manifest series of tusked and tuskless specimens and the same also occurs in other closely allied genera. In some species there is a rudimentary tusk, in others apparently no trace of tusk, while just possibly in some of the larger forms, such as *Dicynodon (Kannemeyeria)*, most probably the female is also tusked

Exactly what the function of the tusk may have been is unknown. Many suggestions have been made which are manifestly incorrect. Pretty certainly the tusks have nothing to do with the procuring of food as the females in which they are absent doubtless got on as satisfactorily. Probably they were in *Dicynodon* at least, secondary sexual characters like the spur in the duck-billed platypus

Attention may be called to the relatively enormous size of the skull and the curious way in which the long point of the lower jaw passes up into the groove in the upper.

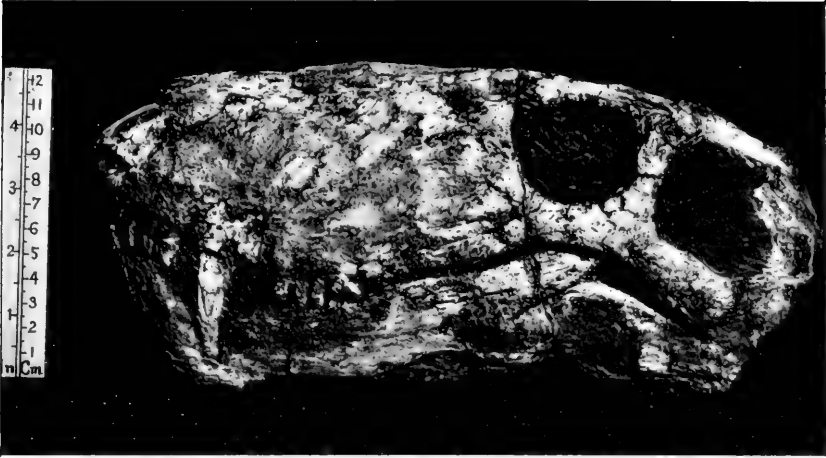
We find many other mammal-like reptiles of which the Therocephalians, Dromasaurians, and the Cynodonts are the most important. Although these insectivorous and carnivorous types are less mammal-like in some respects than the Anomodonts, they agree more closely with the mammals in the construction of the skull. They all have long, slender limbs adapted for running. The earlier members such as the lower Therocephalians, have the number of toe joints as still found in the lizards and most reptiles, viz.—2, 3, 4, 5, 3; but the Anomodonts, the lower Dromasaurians and the higher Cynodonts have the same number of joints in the toes as is retained in ourselves viz.—2, 3, 3, 3, 3. It is rather interesting to look at one's hand and



*Inostrancevia alexandri* Amalitsky. A photograph of a skeleton of one of the large mammal-like reptiles found fossil on the banks of the Dvina River in north Russia. The skeleton is of large size, the skull being about two feet in length and is extremely closely allied and perhaps identical with some forms found in South Africa

realize that the fingers have all these joints because a remote ancestor took to walking with the feet under the body supporting it off the ground rather than with the feet to the side as in the lizards and crocodiles.

The Cynodonts occur in the Triassic formation and a few survive into the Jurassic. In most points of structure they are extremely mammal-like and it is frequently impossible if the specimen is at all incomplete to say whether we are dealing with one of the Cynodonts or a mammal. The lower jaw is almost entirely formed by a large single bone, the posterior bones being small, and the bone on which the jaw hinges is also small thus foreshadowing the mammalian condition, the dentary bone, the angular, articular and surangular being quite small, as is also the quadrate bone. The teeth are in most forms of a carnivorous type, composed of sharp incisors, long sharp



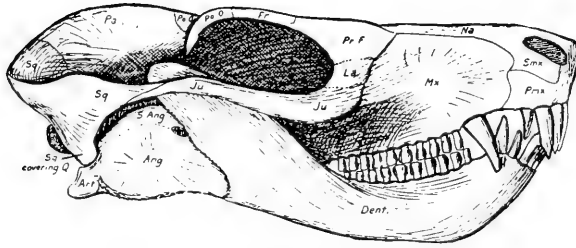
*Scymnognathus angusticeps* Broom. This is one of the South African forms closely allied to the better known Russian *Inostrancevia alexandri*

canines and cusped molars, the cusps being almost exactly like those of the carnivorous mammals.

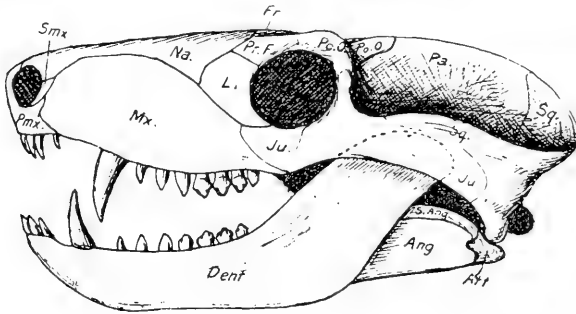
A couple of months ago I discovered that in the Cynodonts the incisors, canines and premolars are preceded by an earlier set exactly as in ourselves. It would probably be inappropriate to call them milk teeth as it is very unlikely that the Cynodonts provided their young with milk, but there can be no doubt that the young had a first temporary set of front teeth like most mammals.

Besides solving the question of the origin of the mammals, the Karroo fossil beds have thrown some light on the origin of birds. There has been considerable discussion as to whether birds were derived from flying bat-like reptiles called pterodactyls or from the dinosaurs. Some have even gone so far as to derive the flying birds from the pterodactyls and the running birds such as the ostrich from the dinosaurs. Dr. Lucas is one of those who favors a double origin for the birds. Professor Osborn some years ago argued in favor of the birds and dinosaurs having come from a common ancestor in Permian times. A few years ago I maintained, as the result of my studies on the development of the ostrich, that the ancestor of the bird though not a dinosaur was nearly a dinosaur, and that the bird and the carnivorous dinosaur were derived from a group of primitive dinosaur-like reptiles that were capable of running on their hind legs. A recent discovery in South Africa reveals just such a type as we required for the common ancestry of the birds and the dinosaurs and this form is also not far removed from the ancestor of the pterodactyl. The birds, pterodactyls, and carnivorous dinosaurs are all probably sprung from a small reptile such as the one recently discovered in South Africa and named by me *Euparkeria*.

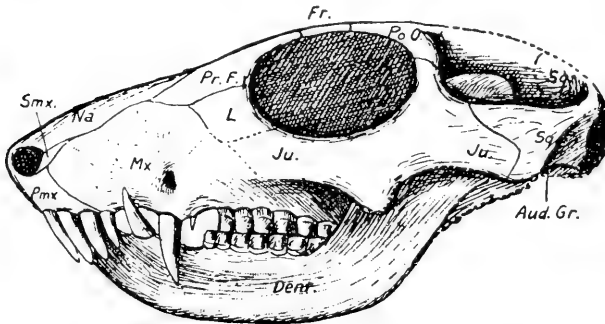
Another interesting fact that seems to be brought out by our study of the



Skull of *Bauria cynops* Broom, about one-half natural size. This is the most primitive of the very mammal-like reptiles belonging to the group of Cynodonts. The dentition, it will be observed, is like that of the mammal except in that the grinding teeth are simply little pegs not unlike those found in the armadillo



Skull of *Nyctosaurus larvatus* Owen, slightly reduced. This is one of the most mammal-like of the reptiles belonging to the Cynodonts. Were it not for the composite character of the lower jaw it might readily be regarded as a mammal



Skull of *Sesamodon browni* Broom. This is another type of cynodont reptile which is in some respects more like the mammal than any other

South African fossil forms is that it was probably the development of the active Cynodonts that led to the development of the active reptiles such as *Euparkeria*. For possibly two million years the carnivorous mammal-like reptiles had an abundant supply of food in the form of the small Anomodonts. In lower Triassic times the smaller Anomodonts seem to have become extinct for some reason and the carnivorous forms had to obtain a new diet which was probably a little lizard-like animal called *Procolophon*, and possibly other small reptiles of a similar type. It was possibly this new activity that gave rise to the Cynodonts. In upper Triassic times the Procolophons became extinct and the small Cynodonts were driven to attacking

the more active types like *Euparkeria*. The rivalry between these forms resulted in the greatly increased activity of both, the active four-footed forms becoming the primitive mammals and those which run on their hind legs gave rise to the theropodous dinosaurs and the ancestral birds. The further evolution of the bird was doubtless the result of its taking to an arboreal habit and developing feathers.



# THE STEFÁNSSON EXPEDITION AND OTHER ARCTIC EXPLORATIONS

By A. W. Greely

Major-General, United States Army, Retired

IT is interesting to note the great variety of Arctic plans that have engaged the attention of geographic travelers since the attainment of the North Pole has ceased to be a polar quest of primary and overwhelming importance. Polar exploration is not dead, it has been reborn in spirit and revived into daring and persistent action.

During the year 1912 at least a dozen schemes of exploration were launched, of which more than one-half assumed definite form as to organization and in their equipment. In view of the recent and unexpected discovery of Nicholas Second Land, it may be of interest to the readers of the *AMERICAN MUSEUM JOURNAL* to have set before them the aims and operations of the principal Arctic expeditions, eight in number, which are now being carried forward, or were recently accomplished, through the efforts of seven separate nationalities.

Three of these parties took the field during 1912, two devoting their energies to Greenland, while the third was in the nature of a preliminary voyage around Spitzbergen. The German polar expedition for the making of the northeast passage around Asia in 1913 was commanded by Lieutenant Schröder-Stranz who sailed in the "Herzog Ernst" for preliminary explorations to the northeast of Spitzbergen. Failing to push north along the east coast owing to heavy ice, he finally succeeded in reaching Treurenberg Bay, where his ship was beset and frozen in. Death and disaster were the fate of the party, with no additions to geographical knowledge.

The two expeditions for the crossing of Greenland were more fortunate, both in action and in results. The Swiss expedition, under Dr. A. de Quervain consisted of three Europeans, two Eskimo, four sleds and twenty-nine dogs. Without accident they crossed the inland ice from Disco on the west coast, to Angmagsalik on the east coast. The highest point in their route was 2,550 meters, about 8,370 feet.

Captain J. P. Koch, Royal Danish Navy, already distinguished in the field of exploration, wintered 1912-1913 on the inland ice of the east coast near Cape Denmark, in about 78° north latitude. Starting April 20 this year with five horse-drawn sledges his party crossed to Proven, a short distance to the south of Upernivik. The highest point attained on the glacial ice cap of Greenland was about nine thousand feet. Although Greenland has been previously crossed by Nansen, Peary and De Quervain an eminent geographical authority says: "Koch's crossing is probably the finest achievement of all, owing to the great width of the inland ice at this latitude."

The present year of 1913 has been a year of beginnings among the Arctic explorers, among whom it is to be said Commander Wilkitzky is not classed.

The Russian expedition of Captain Sedof sailed late in the summer of 1912 with the intention of making Franz Josef Land its base of operations for visiting the Pole.

Another expedition to Franz Josef Land has a sentimental as well as a physical aspect. This Arctic Archipelago it will be recalled, was discovered by the Austro-Hungarian expedition of Weyprecht and Payer in August, 1873, when their ship "Tegetthoff" was beset. It was first visited by Payer, whose charts of the region have been the subject of much discussion and of material modifications. Now after forty years, his son, Jules de Payer, a French citizen, is to make a scientific survey of this Arctic country. From a land base he hopes to cover the region through the use of a power boat and two aëroplanes.

The American Museum expedition under Donald B. MacMillan for the exploration of Crocker Land, and that initiated by Captain Amundsen for a drift from Bering Strait across the north-polar basin, are too well known to need comment here. The same remark may be made as to the aims and the progress of V. Stefánsson, who so distinguished himself in Arctic America as the representative of the American Museum of Natural History.

While the Arctic explorers specifically mentioned were striving for definite results, the world awakened one morning to learn that what might be called the "first blood" had been drawn by a Russian officer, Commander Wilkitzky, Imperial Russian Navy, while engaged purely on a work of domestic economy and of national interest. His voyage was the prosecution of the survey of the coast waters of northern Asia. For several years Russian officers have been busy in determining and charting a safe and reliable maritime trade-route between the valleys of the great rivers of Siberia and the remainder of the empire.

The discovery of this new Arctic land is but one of many creditable chapters in the history of maritime explorations made by Russian officers and explorers during the past quarter of a century. Unfortunately the publication in Russian text only of the results of these voyages seriously limits the dissemination of the knowledge. Among such Russian texts may be mentioned the Riabouchinsky expedition to Kamtchatka, under the direction of the Imperial Russian Geographical Society. One distinguished Russian geographer, General Jules de Schokalsky, Imperial Navy, has contributed from time to time memoirs of importance, especially relative to the sea-route to Siberia — so important to the whole empire.

As to this route, stimulated by the circumnavigation of Asia by Nordenkiöld, and by the successful demonstration by Wiggins of summer navigation in favorable seasons between Europe and the Yenisei, Russian officers have done daring work of interest and importance in the dangerous ice-clad Siberian ocean. Among these explorations are the well-known surveys of Colonel A. J. Vilitsky in the Obi and Yenisei regions, and the extended

voyages and journeys of Baron Toll in the archipelago of New Siberia, where he eventually perished. Vaguer is the knowledge had of the explorations of A. K. Volossovich between the Lena and the Kolyma, and of T. P. Tolamchef eastward from the Kolyma to Bering Strait. The surveys of Tolamchef had an important though indirect bearing on the discovery of Nicholas Second Land, for it was his favorable report on the possibility of the sea-route via Bering Strait that led the Imperial government to despatch the recent squadron under Commander Wilkitzky. Thus it happened that Wilkitzky adds his name to the roll of fame in the annals of the Russian navy.

The extent of Nicholas Second Land and its exact relations to Crocker Land and the sought-for land of Stefánsson, are not clearly understood by the general public. This is largely due to the inaccuracies and exaggerations which marked the original announcement of this discovery. Published in haste, the accounts were discussed with even greater precipitation.

One geographer, doubtless inaccurately reported, was heralded by the press as authority for the statement that the new land would prove to be "the same as discovered by Rear-Admiral Peary." It was added that "Peary claimed to have discovered what is probably the west side of it, while the Russians may have discovered the east side."

Fortunately this inaccurate newspaper report did not gain large currency. A mere glance at the chart of the Arctic regions — rarely accessible — discloses that Crocker Land and Nicholas Second Land are more than twelve hundred miles apart. It is another physical fact that the "Fram" drifted across the eastern half of the north-polar basin along a route that lies between the two lands.

In some quarters there arose doubts as to whether or not Stefánsson had been forestalled in his aims by Wilkitzky as Scott had been by Amundsen in the Antarctic. That the Canadian authorities were at first in doubt as to the true relations of the two lands, was asserted by the daily press.

Fortunately such fears and apprehension are groundless. Nicholas Second Land can in no way extend eastward to such an extent as even to approach the lands which are believed to exist in the million square miles of unknown regions within the Arctic circle. Crocker Land is situated in the western hemisphere, in about  $104^{\circ}$  west longitude, while Nicholas Second Land is in the eastern hemisphere, in about  $100^{\circ}$  east longitude. The two lands are therefore on diametrically opposite sides of the north-polar ocean.

Meanwhile, on the report of Commander Wilkitzky it is known that Nicholas Second Land is not of continental dimensions, but rather is a narrow land, probably of closely-joined islands. It may perhaps be some two hundred miles long by forty or fifty wide, having possibly half the area of the islands of Nova Zembla.

Certainly all readers of the AMERICAN MUSEUM JOURNAL will rejoice with the writer that our Canadian friends, with their able leader Stefánsson, have a free and unvisited field of exploration open to their Arctic expedition of 1913.



#### IN THE LAND OF THE MAQUIRITARES

The twin peaks of Duida in the distance. This is the mysterious mount of the Maquiritare Indians who believe it the abode of evil spirits. In the rainy season gray mists perpetually enshroud it, cold winds sweep from it over the forests, deep rumblings and continual flashes of lightning tell of the storms among the granite peaks

## TO THE MAQUIRITARES' LAND

By Leo E. Miller

Leader of the Upper Orinoco Expedition of the American Museum

ANY attempt to give a comprehensive account of the movements and results of the Upper Orinoco expedition within the confines of a short magazine article is a difficult undertaking, partly on account of the great distance traversed and partly because of the numerous discoveries and incidents of interest and importance attendant upon the exploration of this all but unknown part of South America.

In the latter part of November, 1912, the writer, accompanied by Mr. F. X. Iglseider as assistant, sailed from New York to Trinidad and thence across the Gulf of Paria and up the Orinoco to Ciudad Bolívar, two hundred and forty miles from the mouth of the turbulent muddy stream. Here a week was spent in provisioning the expedition and in chartering a sloop to carry ourselves and the rather appalling amount of cumbersome equipment to the foot of the cataract of Atures, the first effectual barrier to navigation. The low stage of the water at this, the dry season, together with the numerous, barely submerged rocks and shifting sand-banks render steamboat navigation so hazardous that no attempt is made to ascend higher than the mouth of the Apure. Sailboats of light draft are therefore the only craft available. This latter mode of travel is further facilitated by the prevalence of a steady easterly breeze which with darkness often assumes the proportion of a squall or *chiguaco* as it is called.

The journey from Ciudad Bolívar to Vagré, the port of Atures consumed seventeen days, from December 17 to January 2. A half day had been spent at Caicara and a full day lost below El Infierno waiting for a strong enough breeze to take us through that seething gorge.

Dugouts served to convey the luggage from Vagré to Zamuro a short mile away, and thence the league to Atures on the south bank of the Rio Cataniapo, was covered in ox-drawn carts and other dugouts. At the town of Atures we were hospitably received by General Roberto Pulido, governor of the Department of the Upper Orinoco, and next day proceeded to Salvajito, another league overland. Here we found anchored a trim kerosene launch, capable of taking the expedition to Maipures, the next stage of the journey, in half a day's time. But great was our disappointment to learn that the owner requested the modest sum of four hundred dollars for the service. By no dint of argument could he be persuaded to reduce this figure, for in true Venezuelan style he reasoned that we were sorely in need of his services and must eventually concede to his demand. But in this he was mistaken. One other way of travel lay open, — namely, by a small dugout canoe, and to this recourse was of necessity taken, although three trips were required to transport all the equipment.

Finally, on January 6, in the afternoon, I started with three natives — the canoe so heavily laden as to leave less than three inches of free board above the water — and reached the port of Maipures on the Rio Tuparo before noon of the eighth.

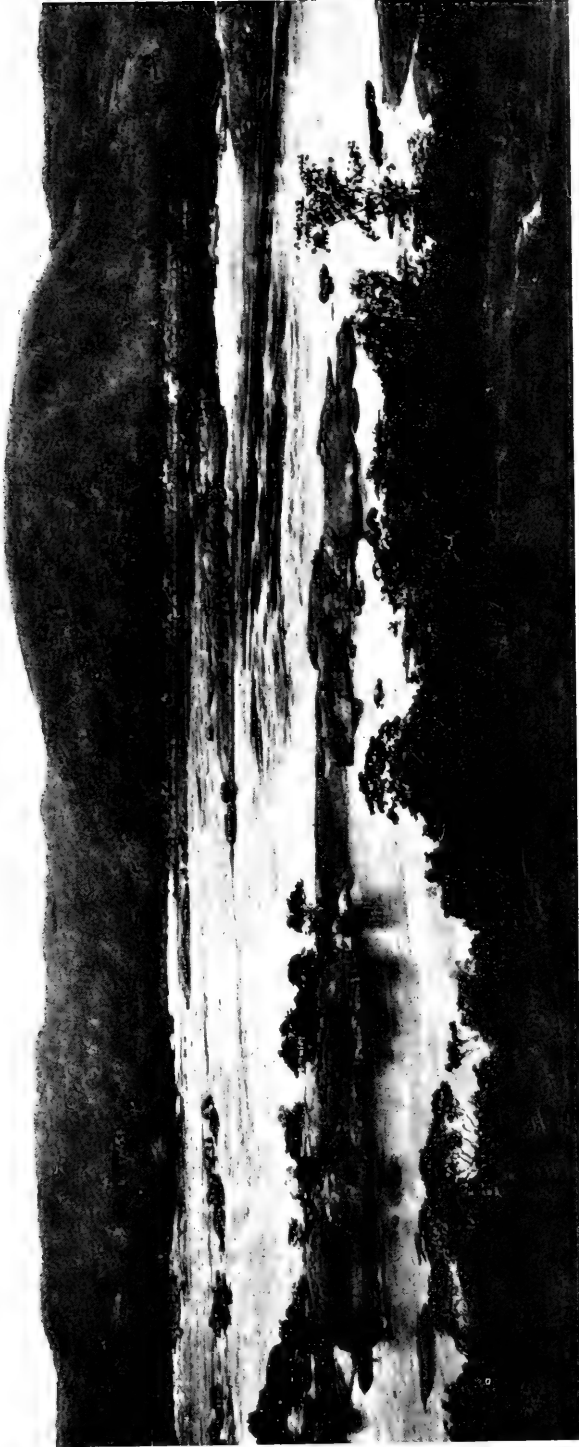
The canoe and two men were immediately sent back to Salvajito, with instructions for Mr. Iglseder to come with the next load. In crossing the rapids of Guajibo, a short distance below the mouth of the Tuparo, one of the natives was lost together with the canoe, and the rest of the party remained stranded on an island nearly two days, until rescued by a passing party of Guajibo Indians.

The portage at Maipures is only three miles across savanna country, interspersed with huge granite boulders and small clumps of forest. During my enforced stay I had ample time to explore the surrounding country and visit the rapids, three in number, which here obstruct the river. The falls of the Carretia, said to be about thirty feet high, block the eastern arm of the Orinoco, which is divided into two branches by the great Isla de Raton. Small collections were made, as well as photographs taken of the rapids, vegetation, and wonderful granite formations. It would be difficult indeed adequately to describe some of these towering blocks of stone, cracked and weathered into fantastic shapes, partially covered with creepers and surrounded by a low growth of spiny palms and gnarled stunted trees. Clumps of pineapples, cacti, and various species of thorny shrubs growing in cracks in the ledges impart to patches of the country a desolate and decidedly desert-like appearance.

Along the river huge masses of rock were exposed by the low water, showing caves, grottoes and other marvelous formations. Many of the sloping ledges are honey-combed with hundreds of pot-holes of various sizes and degrees of perfection.

A large *piraqua* conveyed the expedition to San Fernando de Atabapo in six days' time. We had anticipated easily securing the required native help here, but found that nearly every available man had gone to the rubber camps up the river. It required several days to enlist the number sufficient for our purpose. Then began the arduous voyage on the upper Orinoco. Great playas stretched along the banks almost continually, some of them many miles in length. In many of these, vast numbers of turtles deposited their eggs at night which were eagerly sought in the early morning by Indians and "coro-coro" ibises. Sand-flies, which first became troublesome in Atures, were always present in incredible myriads making the hours of daylight almost unbearable.

The delta of the Ventuari was reached February 8, and for three days we struggled in the rapids that end in a decided fall named Santa Barbara. The strong north wind and monstrous waves added greatly to the difficulty and danger of running this series of rapids. Numberless islands, some of



#### THE RAPIDS OF ATURES

The rapids at Atures with tumultuous channels of water between rock islands, make the first effectual barrier to navigation in the Orinoco. For forty miles, from Atures to Maipures, the river is impassable and presents varied scenes of grandeur. The expedition reached this point by sailing from New York to Trinidad, thence across the Gulf of Paria and up the turbulent muddy Orinoco 240 miles to Ciudad Bolívar, thence a seventeen-day voyage by sloop. The voyage of 240 miles to Ciudad Bolívar is open to tourist travel



Vagre, the port of Atures, was the first stop after passing Ciudad Bolívar where the final provisioning of the expedition had been accomplished. At Vagre the outfit of the expedition was portaged around the rapids



Loading the outfit at Atures. The expedition traveled by dugouts one mile on from Vagre and thence in ox-drawn carts to Atures town along the south bank of the Rio Cataniapo. Atures gives the first experience of the terrible insect pest of the upper Orinoco





Atures town on the Orinoco. The river here presents the northern face of the forty miles of rock and cataract blocking navigation. The cataract sends up a roar heard continually not only at the town but also fully a mile away



Loading equipment at the port of Maipures. A dugout canoe was the means of travel from Salvajito (a league overland from Atures) to the port of Maipures — a dugout so small that three trips were necessary for the transportation

considerable size and all heavily forested, block the mouth of the Ventuari, while the many channels into which the river is divided are thickly sprinkled with granite boulders, amongst which the water swirls and rushes at a terrific rate.

Life on the upper Orinoco at this season is at its height. It was unusual not to pass a number of rubber camps in the course of a day's travel, which always presented a scene of life and activity. It was hard to believe that within a few short weeks all signs of life would vanish and the sites of the camps themselves disappear in a rapidly rising, muddy lake. At many of these camps we were hospitably received, while at others the reception bordered on open hostility so that we deemed it safer to spend the night aboard the little craft or on some vast sand-bank beneath the brilliant constellations.

Daily we strained our eyes for a first sight of the stupendous stone formation which was our goal, and in the afternoon of the twentieth we were rewarded with a first faint view of Duida, the mysterious mount of the Maquiritares. It loomed dim and indistinct in the far distance, a high flat-topped plateau, but presently the mists shifted and revealed two peaks of equal height on the southeast end. A moment later the whole was hidden by rolling masses of vapor. We did not have another view until several days later.

There are two things so typically characteristic of the Orinoco that I cannot refrain from giving them mention. One, the large flocks of *hoatzins* that appear morning and evening in the dense brush that lines the river banks and the other, the schools of porpoises that appear unexpectedly at almost any time of day or night. The latter often remain in the immediate vicinity of a boat an hour or more, coming to the surface frequently to raise their long narrow snouts from the water, give a deep coughing sound and disappear.

Toward the Orinoco, Duida presents a bold front — a sheer cliff hundreds of feet in height. The seven miles of intervening country, between river and mountain, consist of marshes and undulating plains covered with a dense growth of thorny vegetation. Progress through such country is extremely difficult and upon reaching the base of the mountain at this point it seemed that we should doubtlessly be obliged to make wide detours as the barren cliffs are apparently unscalable.

It was therefore decided to ascend the Rio Cunucunuma, a small stream coming from the northeast and entering the Orinoco at right angles. Once within the comparatively narrow confines of this caño, the surroundings are vastly different from the Orinoco and as wild and tropical as one could well wish.

The forest is of towering height generally extending to the edge of the water, forming impregnable walls covered with a dense and even growth



The canoe on its second trip, while crossing the rapids of Guajibó, here met disaster; one of the natives was lost and the others of the party were imprisoned on an island two days until rescued by passing Indians



The savanna country about Maipures is interspersed with huge granite boulders in small clumps of forest. Sometimes rocks of fantastic shape tower to great heights amid vines, palms and gnarled trees.

Maipures is at the southern face of the great rocky bulwark that crosses the river and divides it into the lower and the upper Orinoco



The interior of a rubber camp. On the upper Orinoco the expedition found difficulty in securing help because all natives had gone to the rubber camps along the river beyond. In February these camps present scenes of life and activity to be replaced in a few weeks by primeval solitude



Method of making portions of the trip up the river Cunucunuma. Raudal de Sina near the encampment of the Maquiritare chief. The expedition's temporary camp was made on the shore and the trail to Duida begun

of creepers. Myriads of palms, tall and slender and of many species, rear their heads above the dark green canopy. The water of the stream is of a deep reddish color and so clear as to permit an unobstructed view of the teeming life that flits like shadows over the sandy bottom. Notable among these are rays and electric eels of formidable size, adding very materially to the dangers of navigating the smaller streams.

A number of Indian plantations which we visited were entirely deserted, but the large conical huts furnished convenient stopping places for the nights and the fields provided an abundance of fruits and vegetables.

We made slow headway on account of the swift current and numerous cataracts. After seven days of the most strenuous kind of work we reached Yacare, the encampment of the Maquiritare chief, Antonio Yarecuma, a



Duida stands some seven miles from the river. A trail was cut across the intervening low hills with foot-bridges of felled trees over the small streams to our base of operations at the foot of the mountain. Duida is not an isolated mountain "island" as supposed but connected by hills with the Ventuari and Parima ranges

short twenty miles from the mouth of the river. Finding the place deserted, we descended a short distance to near the mouth of a small creek known to the Indians as the Sina. Here a tract was cleared and a temporary camp pitched.

Duida, which was usually visible a few minutes at or near ten in the morning, rose boldly but a short distance away. Between us lay a series of low hills covered with comparatively open forest and swampy valleys intersected with small streams. A short time after our arrival our captain succeeded in recruiting five Indians and the entire force was at once set to cutting a trail to the foot of the mountain, where the base of supplies and



Maquiritare Indians live in small groups scattered at short distances along the river in the vicinity of Mount Duida. Neither these nor other Indians of the Orinoco region make good assistants on a scientific expedition



The Maquiritare plantations had been wholly deserted for the rubber camps but we were grateful for their huts as shelter at night

operations was to be established. Several windfalls of considerable width had to be cut through and trees to serve as foot-bridges felled across a number of streams. This required considerable time but the work on the whole progressed most satisfactorily and in a week nearly four miles of trail, or over half the estimated distance to the mountain had been completed.

Then came the first signs heralding the approach of the rainy season. The mists that now perpetually enshrouded Mount Duida assumed a deep gray tint and there sprung up suddenly and at frequent intervals cold winds that swept over the forest with cyclonic velocity — bringing many of the great forest trees crashing to the ground — accompanied by vivid flashes and ominous rumblings that clearly told of the forces at work among the lofty peaks.

The Maquiritares, in common with many tribes of South American Indians, are imbued with the belief that the mountain fastnesses are the abode of evil spirits and at the first clash of the elements our Indians showed great uneasiness, finally disappearing under cover of night, taking the boat. Their departure, while appalling at first thought, was not a serious matter on account of the close proximity of Yacare to which numbers of Indians would return at the close of the rubber season, but a few weeks off. Provisions and ammunition we had sufficient for six or eight months.

At this time Mr. Iglseder suffered a severe attack of malaria and the men were immediately sent down the river on an improvised raft to bring a boat from Trocoapure, a rubber camp on the Orinoco. When they returned beriberi had set in and Mr. Iglseder's condition was so serious that retreat was not only necessary but instant flight imperative. Favorable conditions attended the return and in nine days San Fernando de Atabapo was reached.

The collections of birds are large and have yielded a number of new species and one genus new to science. Other results of the expedition are most interesting and surprising. Mount Duida is not the isolated mountain "island" as was supposed, but is connected with the mountains of the Ventuari and Parima Range by a series of hills. Its elevation is comparatively low, being less than six thousand feet. Any attempt to reach the top, which to all appearances is rugged bare granite, should be made from the west, as the slope is gradual and forested for a considerable distance up.

To secure the best results, assistants should be taken from Trinidad, as both Venezuelans and Indians are untrustworthy and totally lacking in intelligence. The dry season is much shorter than in the lower Orinoco and work must be pushed with all possible speed.



Totem poles in the almost deserted village of Kitwinskole<sup>1</sup>

## SOME KITKSAN TOTEM POLES

By George T. Emmons

Lieutenant, United States Navy, Retired

**U**NDER the general name of Tsimshian, are included the three dialectic divisions of that linguistic stock which occupies the extreme northwestern coast of British Columbia and the valleys of the rivers that reach the sea thereabouts.

NOTE.— The Museum has on exhibition a large number of totem poles from various parts of the North Pacific Coast, and many of the most valuable collections made by Lieutenant Emmons are the property of the institution.

<sup>1</sup> A wealth of elaborately carved heraldic columns is to be found in the old and almost deserted village of Kitwinskole on the Kitwinskole River some twenty miles inland from Kitwingach, on the old trail to the Nass River. These columns are fast going to decay, but are still treasured by the owners who return here for their potlatches and burial ceremonies. The photograph shows the northern portion of the village from in front of the house of the head chief of the Lakyebo clan.

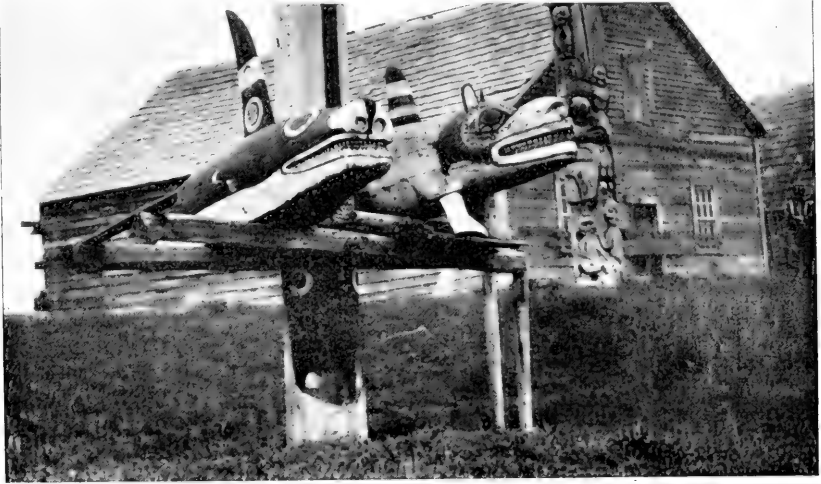


Specifically, this name belongs only to the dwellers of the seaboard. Its meaning, "in the Shian" (the native name of the Skeena River) marks them as sojourners within the confines of the river, and this they were, for their permanent villages were on the coast and they resorted to the lower river only during the fishing season to procure their winter food supply of salmon. The inhabitants of the valley of the Nass are known as Niska and those who live on the upper reaches of the Skeena and its tributaries, beyond the cañon, are the Kitksan [Kitishian]— "people of the Shian," implying a permanency of residence on and an ownership of the river. This inland division claims to be the parent stock from which both the Tsimshian and the Niska have descended.

The oldest local traditions of the Kitksan go back to the subsidence of the flood, when those who were saved landed on the north bank of the river just below and across from the mouth of the Bulkley and founded *Tahm lah halm* which is so often mentioned in song and story. Here they remained for many generations until they became a great people, and to express their numbers, the old native who gave me the following account of their dispersion said that when the geese in their migration were passing over the village, the assembled multitudes would raise a mighty shout and the frightened birds would fold their wings and fall to the ground. After a season of extreme cold, snow continued to fall late in the spring long after the salmon should have run in from the sea, and starvation looked the people in the face. Driven to desperation and resentment against the spirit of the cold, an old chief soaked a dried salmon in water until it assumed a fresh appearance, and spitting it after the manner of cooking the fresh fish, he went without the doorway and in a loud voice reviled the ice spirit saying, "You have no strength, you are but a weakling, you cannot hurt us and keep the salmon away. See the fresh new fish I took this morning, see it ready for the fire!" This so incensed the spirit that it sent a mighty flood, the ice in the river gorged and then the water rose and bursting its bounds swept all before it, and in consternation the people fled and in small bands sought new homes, some following the river to the coast, others crossing overland to the bars while those who remained settled at favorable points along the upper river. Other versions of the dispersion are quite different in detail but all agree in the fact that the want of food after an extended period of extreme cold caused an exodus and a division of the people.

The Kitksan comprise seven geographic divisions that might best be termed village communities or bands, each one of which has a fixed village within well-defined territorial limits for hunting, fishing and berry-gathering although travel by the river is open to all. These divisions take the names of the villages with the prefix of *Kit*, "people." Each community is composed of two or more of the four totemic clans living together through the necessity of intermarriage and for social and protective purposes. The

villages are all on the main river or its tributaries, the houses are arranged in one or two parallel lines on elevated beaches overlooking the water. The clans are grouped together. But to-day under missionary influence the old villages are being deserted for new sites or when still inhabited the primitive communal houses are giving place to small modern dwellings, and with the building of the Grand Trunk Railway through the country every vestige of the old life will soon disappear as will the people themselves.



THE KILLER-WHALE [AT THE LEFT] AND "BEAR-UNDER-WATER" AS CREST FIGURES IN FRONT OF A CHIEF'S HOUSE

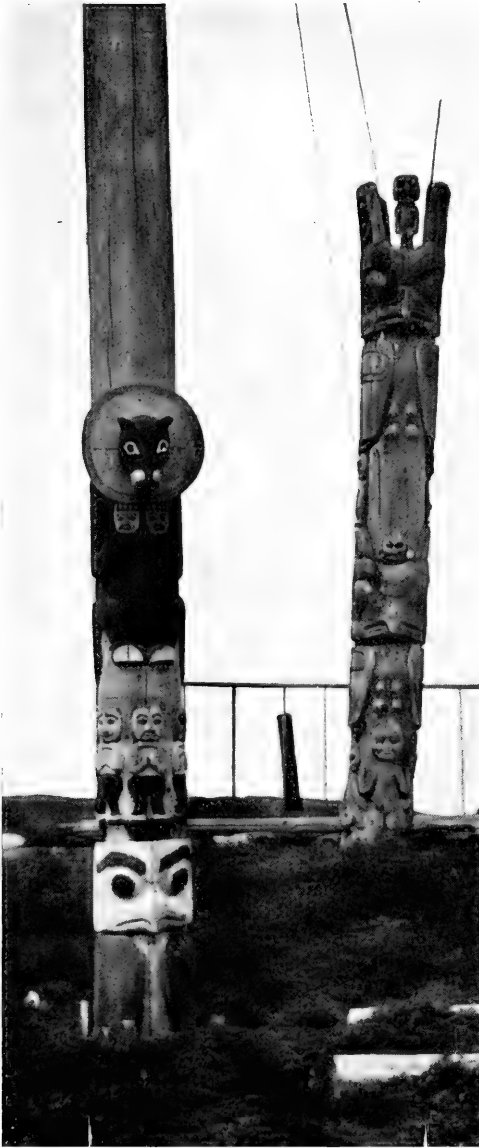
In some instances individual crest figures are placed on platforms in front of the houses and serve the same purpose as the heraldic columns in displaying the emblem. In the village of Kishpiyeoux in front of the house of Gaal, chief of the Kish-hash clan, are large painted wooden figures of the two principal crests of the division — the killer-whale, indicated by the curved dorsal fin with the circular hole in the base below the horizontal white stripe, and the mythical "bear-under-water" in which a horizontal striped dorsal fin rises above the back of a bear figure. Between these two is a tall, slender, tapering pole, carved and painted to represent a snake. The head is black and a black line extends the entire length down the middle of the back. It is slightly octagonal in form and the sides are adzed to represent scales. The snake is a crest of Chief Gaal's direct family, not a general clan emblem. It comes to them from the killing of an immense water-snake by one of the family in early days, after it had destroyed many people and its last victim was a young woman of the family who is represented by the carved head half hidden by the grass, below the snake's mouth. This use of the snake as a family crest and its display on a totem pole is the only instance of the kind that I have seen among the Kitksan or other divisions of the Tsimshian people

The social organization of the Kitksan is founded on matriarchy, and consists of four exogamic clans composed of households, each under its immediate house head, but all acknowledging the general authority of a hereditary chief who presides over the councils in the discussions of all family affairs. The clan is the unit of political and racial life. Individuality without the clan does not exist. The act of one is assumed by all, and a very exact code of well-formulated laws governs the relations of these bodies to one another. The members of a clan may marry in any of the other three divisions. Descent being in the mother's line, rank and property always remain in the clan. The brother or the maternal nephew succeeds to the chieftainship and the wife of the deceased retains her position in the household only by marrying the successor.

The clans take their names from their principal emblems, the wolf, the eagle and the raven or frog, except in the case of the Kishhash — "people of the fire-weed" — who are represented by two or more equally important animal motives. A number of subsidiary emblems are claimed by each clan and others of less importance belong to households only.

In Kitwingach is a very elaborately carved column of the Kanhada clan in which the frog crest is represented to the exclusion of the raven. At the base is a bear figure in the position of having been strangled in the noose of the twisted rawhide snare; above this is a frog, then a story of the household is told by the canoe with three heads: — In a Haida raid on the village a woman of the family was carried away to the Queen Charlotte Islands. Her captor treated her so cruelly that she killed him and cut off his head, and making her escape in a canoe with her child she crossed to the mainland and finally reached her home. The canoe typifies her escape, and the three heads represent in succession the mother, the child and the husband. Above the canoe is a human figure holding a frog and seated on the head is the small owl *mar dex* (which is a clan emblem) holding a frog





Another column of the Kish-hash clan illustrates the story of the bear that lives in the moon and carries children away from the earth. At the base is represented the great horned owl (*gwute gwu nooks*) a clan crest; above, three children, and finally the bear with its head through the full moon, which latter is also a crest of this family. Beyond and to the right is a very old and beautifully carved Kish-hash column representing two owls and several small human figures

The emblem is displayed upon articles of ceremonial dress and festival paraphernalia but more particularly and with greatest effect upon the heraldic columns or totem poles that characterize the villages of this people.

These carved columns which form the most conspicuous and attractive feature of the old settlements differ materially from those of the coast tribes. They never form the entrance of the house as with the Haida, nor are they used as mortuary receptacles for the ashes of the dead. They are never placed within the house forming the supports for the roof beams as with the Tlingit and others, nor do they stand in contact with or alongside of the dwelling, but in every instance they form a quite regular line parallel with and the distance of a broad roadway in front of the houses. They are less massive than those of the coast, which is the natural consequence of the smaller tree growth of the interior, but while often slender they are very tall. Cedar is the wood generally used and much preferred from its fine grain, lightness and supposed durability. Some columns are elabo-



THE SAVAGE "HOW-HOW" IS A FAMILY CREST

In the village of Kitwingach, on a line with the old grave enclosures, but standing by itself in an open space between the two rows of houses, is a boxlike platform on which stands the rather crude figure of an animal known as "how-how." As the story goes: — In old times a savage animal different from any known to the country made its home on a wooded island in the Skeena River and preyed upon travelers and hunters camping thereabouts, until finally it was killed by one of the Lakyebo clan. To commemorate this exploit it was taken by his household as a particular crest and as such is displayed both in this manner and surmounting carved columns in front of the houses.

The legends of the Tsimshian and associate people are replete with stories of mythical beings and fabled monsters that are believed to exist or to have existed, and from encounters or association with these by their ancestors, families have assumed crests that have no known prototype. But these are generally of the water or the air and are very complex in form, while the representation of the how-how is a simple animal figure, although wholly unlike that of any species common to this locality. I would suggest that the story might be really true, and that the animal unknown to this people might have been a mountain lion, so common to the more southern and interior portions of British Columbia, that had wandered across the mountains and failing to find a sufficient food supply in its new home had attacked stray travelers along the river. The bear is the only dangerous mammal in this section and the people are so well acquainted with it that they could never mistake it for any other animal. And the native artist in his greatest latitude would never represent the bear form with the peculiar type of tail which always characterizes the representations of the how-how and which corresponds so well to that of the lion

rately carved throughout their length and those of greater girth are more often hollowed out or flattened along the bank for ease of handling. Others are carved with one or more figures at the base and at the top with the inter-



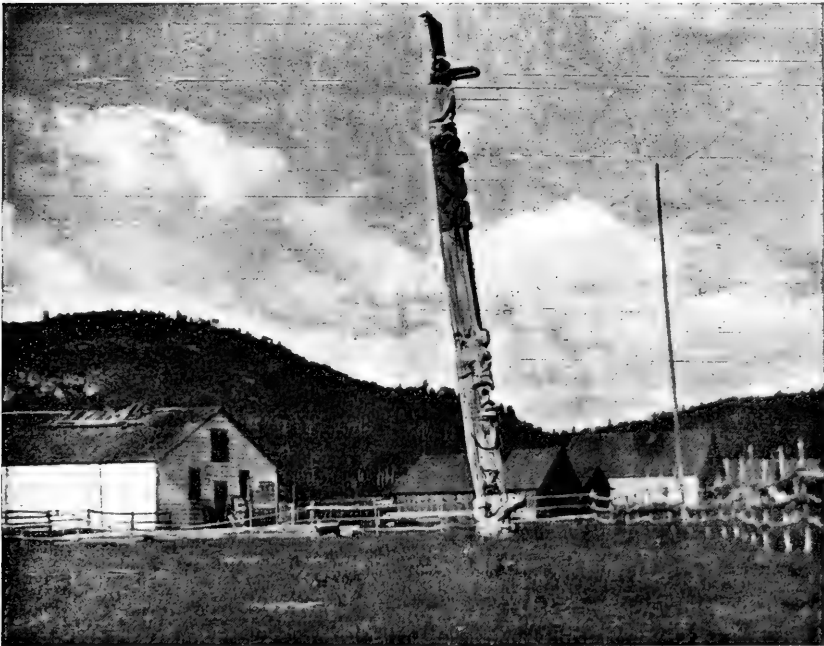
vening surface adzed or the natural tree trunk with the branches and bark removed. I believe that when erected all columns were painted in the native colors of red and black and sometimes white but time and the elements have obliterated all traces of color in the older ones.

It is by means of these carvings that this people without letters, have recorded and preserved their history, which includes their legends of origin, their hero tales, their clan affiliation and particularly such household or family events as are of more than passing interest. The erection of the column usually follows the succession to the head of the family or the building of a new house, and besides honoring the memory of the dead it increases the importance of the living and reflects glory upon the clan at large. Human and animal figures, one superimposed upon the other, are represented. These are generally in low relief because of the character of the field of ornamentation — which is a tree trunk of moderate diameter and considerable height standing wholly without support. The front and sides of the pole are carved while the back is a solid plane surface which preserves

Before the advent of Europeans the coast and river tribes were continually carrying on war by means of raids. In one of these a great war party of Haidas ascended the Skeena River and surprised the people of Kishpiyeoux when many of the men were away. They burned the village and took back to their island home many women as slaves. One of these later made her escape in a small canoe and returned to the village. Upon her death a memorial column was raised to her memory. She is represented at the base, and a small Haida canoe suspended across her body illustrates her means of escape. The eagle, her clan emblem, is shown over her head and surmounting the pole. This woman killed her husband and cut off his head before making her escape with her child and originally there were three carved wooden heads in the canoe

the strength of the column to withstand the heavy winds that sweep through these river valleys. While most of the figures are more or less conventionalized, particularly those of human beings, mythical animals and bears, yet the Kitksan are very independent in their treatment of most other animal forms, and represent them in many different positions very true to nature. This is particularly so in the case of the bird figures that so often surmount the poles. It is customary to give the clan or house crest the place of honor at the top of the pole and more often too at the base, while more for ornamental purposes it may figure in many positions between, where also may be pictured some family story or exploit or some connection through marriage. Every figure represented here has some clan or household significance although the present generation cannot always account for the appearance of human figures on some of the older columns.

To-day the old columns are fast going to decay and their places are not being supplied by new ones. And with the loss of interest in this custom is a growing ignorance which in a few years will result in much difficulty if not in an impossibility in interpreting these old stories in carved tree trunks.



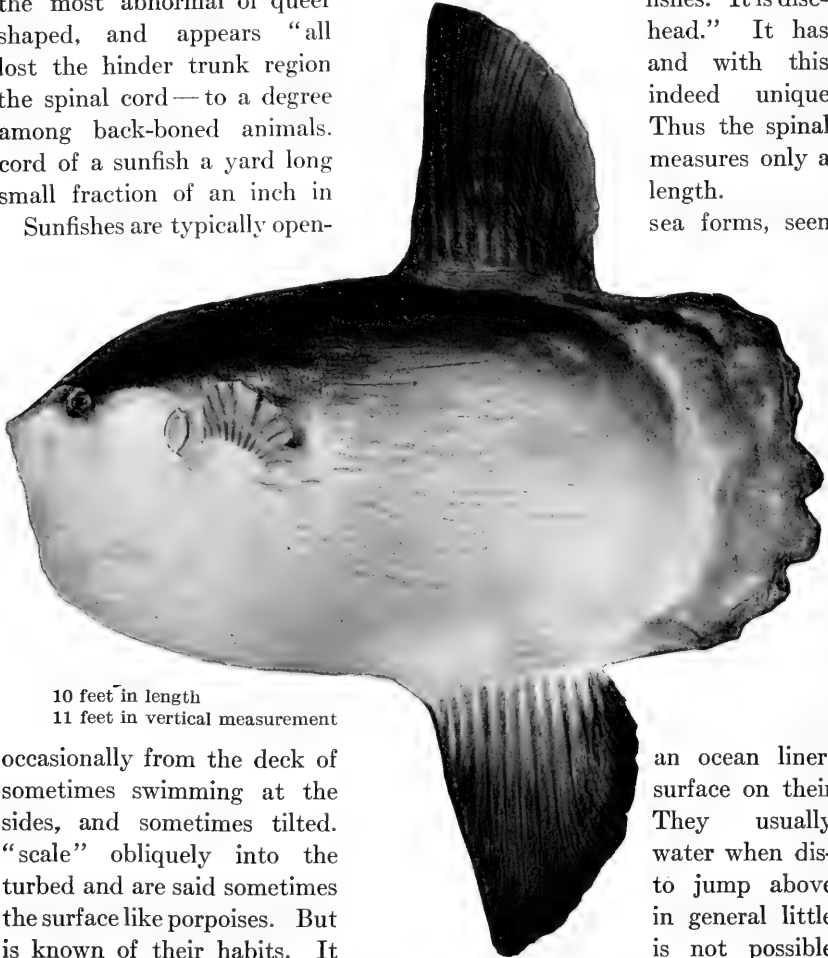
Totem poles in the village of Kitwingach in front of the house of a chief of the Kanhada clan

## A RECORD SUNFISH

By Bashford Dean

THE Museum has recently acquired a mounted specimen of a monster sea sunfish, *Mola mola*, which was taken in 1910 off the coast of southern California. It appears that its captor, Mr. D. H. Buxton, "hooked it while angling." The sunfish has the reputation of being one of the most abnormal of queer shaped, and appears "all lost the hinder trunk region the spinal cord—to a degree among back-boned animals. cord of a sunfish a yard long small fraction of an inch in length. Sunfishes are typically open-

fishes. It is disc-head." It has and with this indeed unique Thus the spinal measures only a length. sea forms, seen



10 feet in length  
11 feet in vertical measurement

occasionally from the deck of sometimes swimming at the sides, and sometimes tilted. "scale" obliquely into the turbid and are said sometimes the surface like porpoises. But is known of their habits. It to explain the "adaptations"

is supposed to have undergone, and the steps in its evolution. Several of its earlier stages however, are known and they show how the tail region comes to be changed. Furthermore a clue as to the "cause" of its modifications was obtained by chance when the puzzle of the repro-

an ocean liner, surface on their They usually water when dis- to jump above in general little is not possible which this fish

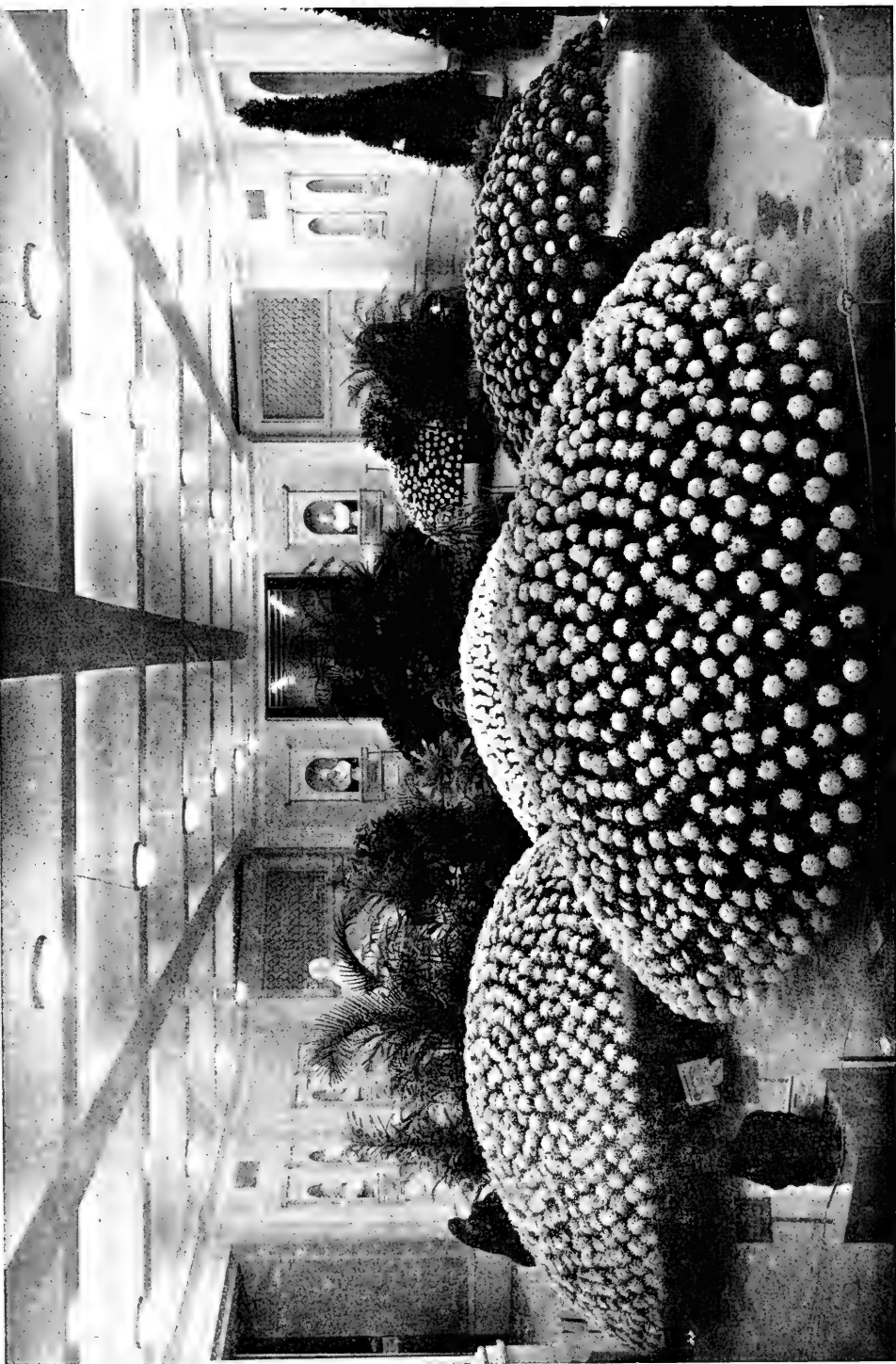


duction of eels was studied; for it was discovered that young eels were often found in the stomachs of small sunfishes, and from what we now know of the natural history of eels, it seems clear that at one stage of its life the sunfish lives in deep water.<sup>1</sup> Its curious shape therefore may in some way be connected with its living under conditions of great pressure, where most fishes develop huge heads and spindling trunks.

Small specimens of sunfish are fairly common in the warmer seas. Large specimens however rarely come to the hands of the naturalist, so the present fish has a certain merit since it is apparently the largest of its kind to find its way to a museum. Dr. David Starr Jordan records that a specimen taken in 1893 near Los Angeles, weighed in life 1800 pounds, and measured eight feet two inches from snout to tail. The present specimen was ten feet, one inch in length when caught and nearly eleven feet in vertical measurement. The only record of a larger specimen known to the writer, was given in a popular magazine several years ago where a photograph was reproduced of a sunfish which had been killed by a steamer's propeller blade near the harbor of Sydney. This specimen, it is said, measured ten feet in length and was no less than fourteen feet in vertical measurement. Its weight was 4400 pounds.

There can be no question that the present specimen had attained great age, although its age cannot be estimated definitely. By analogy with other fishes it could hardly have been less than twenty years old and it may have been nearly a hundred. It shows an interesting old age character in the wrinkles which appear at many points, as shown in the photograph. These "wrinkles" are thin ridges formed originally from folds of skin whose sides had grown together — so completely in fact, that sections show that the ridge is solid, leaving the inner surface of the skin quite smooth. Thus the "wrinkles" are normal features, not due to defective taxidermy, as one at first suspects. Similar wrinkles appear in the photograph, which was taken of the fish as it was hoisted out of water. The tail of the present specimen had been badly injured, probably by attacks of sharks or of killer-whales, but its outline is to a large degree regenerated.

<sup>1</sup> Since this was written, a paper of Dr. Pellegrin (*Bull. Soc. Zool. de France*, vol. xxxvii. p. 228) has been received, which indicates that sunfishes collect and spawn (April) in definite areas (banks) in relatively deep water — as in the bay of Port-de-France. The eggs are minute.



*Photo by Walter L. Beasley*

**VIEW OF MEMORIAL HALL IN THE AMERICAN MUSEUM**

This photograph taken during the exhibit of the Horticultural Society of New York and showing six of the bush chrysanthemums which attracted so much attention, is inserted especially to call attention to the soft and even effect given by the modern method of electric lighting recently installed

## MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have been elected to membership in the Museum:

*Life Members*, MESSRS. C. M. BERGSTRESSER, HENRY W. BOETTGER, ROBERT BOETTGER, LOUIS J. BONRY, JAMES C. BRADY, J. HOWARD FORD, A. V. de GOICOURIA, WILLIAM KENNON JEWETT, WILLIAM LATHROP RICH, THOMAS F. RYAN, BYRON L. SMITH, ALFRED G. VANDERBILT;

*Sustaining Members*, MESSRS. WILLIAM BRUCE-BROWN, DAVID LIEBMANN, EWALD H. SCHNIEWIND;

*Annual Members*, MRS. G. FALK, MRS. E. FREUND, MRS. EDWARD A. GROSSMANN, MRS. FREDERICK A. HALSEY, MRS. BLANCHE W. HULL, MRS. PERCY JACKSON, MRS. JOHN A. JOSEPH, JR., MRS. A. W. OPENHYM, MRS. WILLIAM A. PERRY, MRS. V. SYDNEY ROTHSCHILD, MRS. WILLIAM CUMMINGS SHANNON, the MISSES ALICE H. ANNAN, LILLIAN BENET, CAROLINE CHOATE, LUCY HUNT, M. E. LOWNDES, EMILY F. SPOONER, MAY STERNS, DR. OTTO SUSSMAN and MESSRS. JOHN DUNBAR ADAMS, WINTHROP W. ALDRICH, LEON SAMSON ALTMAYER, C. L. AUGER, THOMAS H. BARBER, IRA BARROWS, JOSEPH H. BENDIX, D. J. BENOLIEL, MAX BINSWANGER, THOMAS K. BOGGS, HENRY L. CAMMANN, EDWARD B. CAMP, WALTER F. CHAPPELL, H. C. CHATFIELD-TAYLOR, HUGH J. CHISHOLM, A. P. CLAPP, J. WILLIAM CLARK, ALBERT CLAYBURGH, A. DE WITT COCHRANE, AARON COLEMAN, FREDERIC M. CREHORE, WILLIAM H. DAVIDGE, J. M. DITTENHOEFER, GEORGE EHRET, JR., CHARLES EWING, WILLIAM J. FLESH, M. FRANKFORT, GEORGE C. FRASER, ROBERT A. GARDINER, LOUIS GOLDSMITH, I. EDWIN GOLDWASSER, FRED H. GREENEBAUM, ALFRED HARRIS, J. ARMORY HASKELL, H. C. HEIMERDINGER, JOHN LOCKMAN HELMUTH, HAROLD HERRICK, M. H. HIRSCHBERG, BERTHOLD S. HORKHEIMER, W. TRUSLOW HYDE, GUY B. JOHNSON, J. HENRY KAHRS, JOHN CLAPPERTON KERR, LEE KOHNS, JACOB J. LESSER, ARTHUR E. LONDERBACK, ANGUS S. MACDONALD, THOMAS S. McLANE, HERBERT R. MAINZER, SAMUEL MARCUS, FREDERICK MATHESIUS, JR., H. F. NOYES, WILLIAM BARCLAY PARSONS, AARON S. PENNINGTON, WILLIAM D. N. PERINE, SETH LOW PIERREPOINT, RUDOLPH RECHT, L. REICHENBACH, HENRY B. H. RIPLEY, WILLIAM M. SAVIN, HEWLETT SCUDDER, JR., R. D. SHIPMAN, MICHAEL M. SHOEMAKER, AUGUSTINE J. SMITH, FREDERIC O. SPEDDEN, J. CLINTON SPENCER, WILLIAM FREDERICK STAFFORD, SPENCER W. STEWART, FREDERIC J. STIMSON, JOHN R. STRONG, STERRETT TATE, ROBERT THORNE, H. W. VAN WAGENEN, E. ROBBINS WALKER.

THE electric lighting of large buildings has progressed so rapidly that what seemed admirable a decade ago is now hopelessly behind the times. In this respect the Museum has fared badly; not only is the power insufficient to operate all the old incandescent lights at once, but even at the best they contrast but poorly with the modern tungsten lights. The view of memorial hall taken during the recent exhibit of the Horticultural Society of New York, shows well the vast improvement of the present lights over the old-time clusters. The light though brilliant is soft, and while every part of the hall is illuminated and shadows are obliterated, the eye of the observer is not strained. This shows what might be accomplished throughout the building were funds available for the replacement of the old lamps by new, since the present engine power is sufficient for a complete installation of tungsten lamps. The small lecture halls, the hall containing the exhibit of the department of public health and that containing the collection of local birds have been equipped with new fixtures and tungsten lamps, and these give more than a hint of the improvement that might be effected in other halls.

DR. CARLOS DE LA TORRE of the University of Havana, Cuba, has made a very interesting and valuable addition to the collection of conchology in the department of invertebrate zoology. This material was secured by Dr. F. E. Lutz in his recent visit to Cuba and consists of land shells, many of which are described by Dr. La Torre. The genus *Urocoptis* forms the larger number of these and the cotypes which accompany them add immensely to their immediate interest. There are many specimens of the round-mouthed shells, a number of Helicidæ and some very interesting and striking examples of *Cerion*. The gift embraces 139 species and 655 specimens.

A SERIES of three lectures has been planned for the classes of blind children that visit the Museum. In the first of these on December 18, Admiral Robert E. Peary will recount some of the experiences of his memorable Arctic journey which resulted in the attainment of the North Pole.

On December 31, Professor Henry Fairfield Osborn will read a paper on "Final Results of the Phylogeny in the Titanotheres" before the American Society of Palæontologists

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A PANEL recently completed in the tertiary mammal hall of the American Museum shows the geographical distribution of rhinoceroses, past and present. These animals now surviving only in the Oriental and Ethiopian regions were abundant in the Tertiary over all the northern continents. Skulls of the principal types, existing and extinct, are arranged in the four sections of the panel representing North America, Asia, Europe and Africa. Their evolutionary history in this continent from their first appearance in the Eocene to their extinction in the Pliocene is also set forth.

THE American Anthropological Association and the American Folk-Lore Society will hold their annual meetings at the Museum, December 29-31.

THE thirty-first stated meeting of the American Ornithologists' Union, held at the Museum from November 11 to 14, was one of the most largely attended in the history of the association. The one hundred and twenty members who registered represented twelve states, and several Canadian members were also present. Illustrated papers of especial interest were those on "Birds of the Bogotá Region of Colombia" by Dr. F. M. Chapman; "Crossing the Andes of Peru," by Dr. Wilfred H. Osgood; and "Birds of the South Atlantic," by Mr. Robert C. Murphy. By the courtesy of Mr. Robert W. Priest of the Gaumont Company there was a special exhibition of the Scott' motion pictures showing the animal life of the Antarctic. The next meeting will be held in Washington, D. C., during April, 1914.

DR. W. D. MATTHEW has been invited to contribute to the series of Silliman Lectures at Yale University, commemorative this year of the centenary of the birth of James Dwight Dana. His subject will be the "Tertiary Sedimentary Record and its Problems," the dates of the lectures, December 18 and 19.

A NEW group in the reptile series that is being constructed under the supervision of Miss M. C. Dickerson, will be opened to the public at about Christmas time. The new group pictures a rocky island with desert plants and hot sunshine, off the



*Photo by Frederick H. Smyth*

**VISITORS WAITING IN LINE FOR ENTRANCE TO THE MUSEUM**

During the four days of the continuance of the fall exhibit of the Horticultural Society of New York, 170,000 people visited the Museum

coast of Lower California and shows the lizards of the locality, the chuckawallas, iguanas and other smaller species. The reptiles of the group were collected by Dr. Charles H. Townsend on the "Albatross" expedition of 1911, which was made possible through the courtesy of the Department of Commerce and Labor at Washington and the generosity of Mr. Arthur Curtiss James.

DR. CLARK WISSLER has been elected vice-president of the Section of Anthropology and Psychology of the New York Academy of Sciences and Dr. Robert H. Lowie has been reelected secretary of the Section.

IN the alcove of the North American archaeology hall of the Museum a mural series of unusual interest has recently been completed. It consists of five polychrome frescoes, three of which are enlarged copies of the frescoes on the walls of the cavern of Font-de-Gaume in France and two are enlarged copies from the ceiling of Altamir in Spain, the latter having been reproduced in color in this magazine for December, 1912. The originals of these are handed down to us from the Old Stone Age and represent palæolithic art at its highest point of perfection. The date of these cavern paintings is problematical but it is safe to say that they were painted at least twenty-five thousand years ago. The copies in the Museum were made by Mr. Albert Operti.

DR. C. V. HARTMAN, curator of ethnology of the Naturhistoriska Riksmuseum of Stockholm, who is well known to American investigators for his researches in Costa Rica, recently spent several days at the Museum.

THE MUSEUM has taken this year a step in the direction of practical public service by including in its members' courses a series of lectures on the "Principles of Healthy Living," which have been greatly appreciated by the teachers in the public schools and by those interested in public-health work.

The first lecture on November 12 was by Walter B. James, trustee of the Museum and professor of clinical medicine at the College of Physicians and Surgeons, on the "Body and its Surroundings"; the second lecture, November 19, was by H. C. Sherman, professor of food chemistry at Columbia University, on "Food"; the third, November 26, by T. A. Storey, professor of hygiene at the College of the City of New York, on "Exercise and Rest"; the fourth, December 3, is to be by Frederic S. Lee, professor of physiology at Columbia University, on "Fresh Air"; and the fifth, December 10, will be given by C.-E. A. Winslow, curator of public health at the American Museum, on "Control of Germ Diseases in the Household." The lectures are to be printed in book form by G. P. Putnam's Sons.

AN eight or nine foot specimen of the peculiar nurse shark, *Ginglymostoma cirratum*, from Florida has recently been received at the Museum, having been brought alive to the New York Aquarium. Plaster molds of it have been made and a cast will be placed on exhibition.

THE department of anthropology has recently purchased from Mr. G. A. Paul of Oldtown, Maine, a collection from the Micmac Indians. The Museum has hitherto possessed very few specimens from this tribe and such specimens are rare in most institutions. The collection includes some old specimens of beadwork and various utensils showing carving similar to the characteristic work of the northeastern New England tribes.

DURING the latter part of December and throughout the coming January, there will be a special exhibit of photographs of the Indians of the Southwest, by Mr. Frederick Monsen, well-known for his artistic work. The pictures will be hung in the west assembly room and in the aisle of the hall of the Woodlands Indians











Natural History.

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